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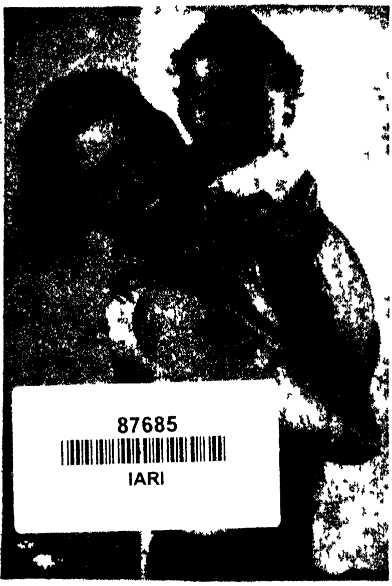

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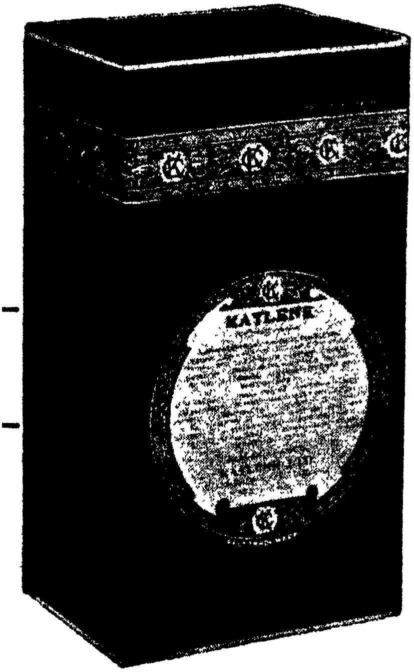

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THE PRACTITIONER

No. 769 JULY, 1932 Vol. CXXIX

1832-1932
and the
British Medical Association

THERE are several analogies between 1832, the year of the great Reform Bill, and the present year, with its National Government. A hundred years ago the effects of the long-drawn-out Napoleonic wars lay heavy on the country; political agitation was acute, financial distress was rampant, and cholera and influenza had ravaged the country. From a medical aspect also reminiscence supplies some points of interest; the process of reconstruction—to employ a word of more recent application—was in being a hundred years ago; there was a new birth of medical societies, which had been a prominent development in the last quarter of the eighteenth century under the leadership of John Hunter, George Fordyce, John Fothergill and John Coakley Lettsom in London, and Andrew Duncan, Sen., in Edinburgh. Under the Esau-like hand of Thomas Wakley the *Lancet* had started on its vigorous career in 1823 and was justifying its name by its incisive treatment of abuses. March, 1832, saw the appearance of the first number of *The Dublin Journal of Medical and Chemical Science: Exhibiting a Comprehensive View of the latest Discoveries in Medicine, Surgery, Chemistry and the Collateral Sciences*, which was the first successful medical journal in Ireland, and after various changes of name now celebrates its centenary as the *Irish Journal of Medical Science.*

In this connection it may be mentioned that in 1832 Sir Dominic Corrigan published his classical account of aortic regurgitation and the characteristic ("leaping") pulse which bears his name. In the provinces, where medical societies had been started in the previous century, fresh ones were formed—the Halifax and District in 1822, St. Helens in 1826, and Nottingham in 1828. Medical schools were started, for example, at Sheffield (1828), Leeds (1831), and Bristol (1833), which are now incorporated in flourishing universities. The teaching of anatomy was greatly helped by Lord Warburton's Anatomy Act of 1832, which provided that all unclaimed bodies should, under proper restrictions, go to the medical schools.

As every medical practitioner knows, the British Medical Association celebrates its centenary this month in London under the presidency of Lord Dawson of Penn, the President of the Royal College of Physicians of London. The Association was founded in 1832 at Worcester as the result of the devoted energy of Sir Charles Hastings (1794–1866), physician to the Worcester General Infirmary, and was then called the Provincial Medical and Surgical Association. On July 19 of that year fifty medical practitioners met in the board-room of the Infirmary and established the fundamental principles of the Association, which it was agreed should hold an annual meeting in one of the provincial towns, changing the place of meeting each year. When the Association met at Bristol in the following year it had a membership of 316, and it is appropriate that now, in its centenary year, it has increased more than a hundredfold. From this small beginning it has steadily expanded to become, indeed. the association of the medical profession of the British Empire. In 1856, as the *Annual Handbook* of the Association now records, its name was changed to the British Medical Association, a London society with that title, founded in 1836, having come to an untimely end. In London it met for the first time in 1862, with a membership of 2,120, under the presidency of Sir George Burrows, and subsequently in 1873 with Sir William Fergusson as president, in 1895, Sir John Russell Reynolds being president, and in 1910, when Sir Henry Butlin occupied the chair. All the presidents of the London meetings had before, at the time, or after been presidents of the Royal College they respectively adorned. During the years 1915–19 the usual annual meetings were suspended, but business meetings (and in 1919 a scientific meeting) were held in London under the chairmanship of Sir Clifford Allbutt.

From 1833 to 1853 the Association published a yearly volume of *Transactions*; in January, 1853, the *Association Medical Journal* appeared, which was a continuation of the *Provincial Medical and Surgical Journal* dating from 1840, and in 1857 it adopted the present title of the *British Medical Journal.* The medical profession owes much to the succession of able and energetic editors who have carried on this difficult task, and at this centenary many will turn with grateful affection to the memory of that great man, Sir Dawson Williams.

HUMPHRY ROLLESTON.

Observations on Gastric and Duodenal Ulcers

BY LORD MOYNIHAN OF LEEDS, K.C.M.G., C.B., M.S.
President of the Royal College of Surgeons.

A LITTLE hesitancy attaches to my inclusion of "Gastric Ulcer" among the common maladies of men. For many years, indeed, until the advent of the surgeon, it was regarded as of great frequency, as very common among young girls, and as almost the chief, if not the sole, lesion concerned with hæmatemesis. Intrusions of the surgeon into the abdominal cavity have, however, shown that gastric ulcer is comparatively infrequent, and that the commonest lesions responsible for "indigestion" lie in the gall-bladder, the appendix, and the duodenum. The discrimination between gastric and duodenal ulcer is one of the triumphs of the surgeon. When in August, 1899, I operated upon a patient for "chronic duodenal ulcer," basing my diagnosis solely upon the clinical history and was able to demonstrate an ulcer quite clearly to a number of interested and sceptical onlookers, it was, I understand, the first occasion in the history of surgery upon which such an event had happened. The fact that an ulcer which had undergone acute perforation lay beyond the pylorus, had been observed by Dean and others; but chronic duodenal ulcer was regarded as a very rare disease; it had never been recognized during lifetime except as a possible cause of such a condition as subphrenic abscess.

After confirming my first experience by many more cases I ventured to call attention to the clinical importance of the condition and in certain circumstances to advocate its deliberate surgical treatment. My contentions were at once vigorously disputed. The symptoms I had enumerated were held to be significant of "acid dyspepsia," "hyperchlorhydria," "acid gastritis" and so on, and not to have the slightest significance as indicative of organic disease. I was rebuked by high authority for failing to realize that in a year or two it was impossible that I should be able to operate upon so many cases as I then recorded, when, in a consecutive period of 72 years at Guy's Hospital, only 67 cases of duodenal ulcer had been observed on the post-mortem table. No less an authority than Sir William Osler told me he felt sure I was mistaken, for in all his life he had seen eight cases only of duodenal ulcer. He was, however, convinced when I operated upon a patient of his. The man had long been under his care for "acid gastritis." I demonstrated the ulcer to a friend of Sir William's from Boston; and performed gastro-enterostomy to the complete satisfaction of the patient. One of the doubters in the discussion, subsequent to the publication of my paper, ridiculed the idea that my list of symptoms could possibly suggest that a duodenal ulcer was their cause, because he had "suffered the identical symptoms for years," and he certainly, he affirmed, had no ulcer! I suggested that he should consult me as a patient. He did not avail himself of the suggestion, and a few weeks later his ulcer underwent perforation, and he was rescued only in the last ditch.

It is far too often the custom to speak of gastric and duodenal ulcer as one and indivisible in causation, symptomatology and treatment. This is a grave mistake. The two diseases occur in different types of individual, as Dr. Arthur Hurst, our chief medical authority, has long insisted. The chemical constituents of the gastric juice are as a rule quite dissimilar; a close analysis of the clinical symptoms reveals subtle, but often quite clearly recognizable, distinctions; perforation and hæmorrhage do not occur with equal relative frequency; carcinoma is not an uncommon terminal result in gastric ulcer—it occurs in less than one in a thousand cases of duodenal ulcer. The pylorus forms a sharp line of division between the two and is rarely transgressed by a duodenal ulcer, almost never by a gastric ulcer.

It is, I think, important to distinguish between acute and chronic gastric ulcers. Acute ulcers are commonly if not invariably associated with toxæmia; an infection in the mouth, on the skin, in the appendix or elsewhere may be the primary cause of those minute shallow erosions of the stomach or duodenum which cause dyspepsia, hæmorrhage or perforation. Hæmorrhage and perforation, though themselves acute, are, with few exceptions, the evidence not of acute but of chronic ulceration which has assumed fresh activity. In a series of gastric ulcers observed by Professor Stewart and myself over a period of twelve years we found that in 61 cases where death occurred from perforation, the ulcer was of the chronic type in 60; in 14 cases where death occurred from hæmorrhage, the ulcer was of the chronic type in 13. In the acute case the ulcer was a terminal condition associated with advanced disease, and hæmorrhage was not the determining cause of death. In a similar series of cases of duodenal ulcer during the same period, this truth also held good; 12 deaths from hæmorrhage all occurred in cases of chronic ulcer; in 117 deaths from perforation there were 109 cases in which the chronic ulcer had given way; in 12 cases acute ulcer was present; so that there were 4 cases in which both acute and chronic ulcers were found—in every one it was the chronic ulcer which had perforated.

Chronic gastric and duodenal ulcers, as Hurst and Stewart demonstrate, have their origin in acute ulceration which for some reason or reasons not fully understood, is prevented from healing which as a rule is swift and unhindered. Chronic ulcers, too, undoubtedly heal. In their sound healing they may produce conditions requiring relief by surgery. "Pyloric stenosis" is virtually always "duodenal" stenosis; contractures in the stomach are usually in the body of the organ and cause the condition known as "hour-glass" stomach. Professor Stewart finds evidence of open or healed ulcers in about 5 per cent. of the bodies examined on the post-mortem table in Leeds. Often no history of any period in which symptoms were present is found in the clinical notes or is to be obtained from relatives. The fact that healing does occur affords, however, a strong—indeed, an undeniable—plea in favour of an adequate trial of medical treatment. No surgeon upon whose judgment I would rely suggests operative measures for anything but the rebellious cases or those in which the ulcer is large and incoercible; emergencies, of course, excepted.

SYMPTOMS

The chief clinical symptoms of ulcer of the stomach are pain, vomiting, and hæmatemesis, and of these the really important one is pain. The supremely significant feature with regard to pain is its punctuality: in the same patient after the same meals it appears with the most exact regularity after the same interval of comfort. If a breakfast is taken at 9.0 a.m., and pain appears at 10.0 a.m. on one day, a similar breakfast on all other days will be followed by the same hour of comfort and the same appearance of pain at the due moment. A time-table of one day, then, fits any other day. Far less attention than it merits is given to a searching analysis of a day's routine. A patient will not seldom tell you he can "set his watch" by the time-incidence of his suffering. The periodicity of the pain is, of course, altered by variations in the quantity and quality of the food and by irregularity of meals.

A point which is well worth attention concerns the rhythm of pain. In cases of gastric ulcer pain which, after an interval, follows the taking of a meal gradually disappears before the next meal. In cases of duodenal ulcer the pain continues until the next meal, or until food is taken to give ease to a wearisome pain. The rhythm of gastric ulcer is "food, comfort, pain, comfort," and then again, "food, comfort, pain, comfort"; of duodenal ulcer it is "food, comfort, pain," and then again, "food, comfort, pain"—a quadruple rhythm in the former disease, a triple rhythm in the latter.

In my series of cases pain appeared within one and a half hours in 3 cases out of 5 of gastric ulcer, and after two hours in 4 cases out of 5 of duodenal ulcer. Seasonal variations are common in duodenal ulcer, less noticed in cases of gastric ulcer. The occurrence of hæmatemesis is often held to indicate with great probability the presence of a gastric ulcer. Hæmorrhage in formidable quantity cannot occur apart from a considerable lesion of the stomach, œsophagus, or duodenum. In the stomach such a lesion may be a chronic ulcer or an acute ulcer. In years gone by, when operations were performed as mistaken efforts at rescue work in cases of copious hæmatemesis, the mucous membrane was often seen to be studded with tiny points from which blood was steadily trickling—the stomach "wept blood." The blood came from multiple points of acute ulceration. If a patient has so large a hæmatemesis as to cause death, and if the cause of the bleeding is the erosion of a vessel in a gastric ulcer, a chronic ulcer will be found far more often than an acute ulcer. So many cases of hæmatemesis are due to the toxæmia of appendicitis or other grave infections, to cirrhosis of the liver, and to splenic anæmia, that no hasty conclusions as to the presence of a chronic gastric ulcer may be drawn from the occurrence of this symptom. In cases of duodenal ulcer, both hæmatemesis and melæna may occur; the latter is almost invariably in excess of the former in quantity and frequency.

A very close scrutiny of all details of the clinical history allows a diagnosis of duodenal ulcer to be made with a considerable degree of confidence. There should always be hesitancy in making a diagnosis of gastric ulcer. A duodenal ulcer is far more common than a gastric ulcer and, therefore, when an " ulcer history " is elicited, a suggestion that the ulcer lies beyond the pylorus has the greater chance of accuracy, since probability is the very guide of life. But there is more to be considered than that. There are so many conditions—having their origin elsewhere, within the abdomen or outside it—which are expressed in terms of gastric discomfort that even the most searching analysis of all symptoms may leave us unconvinced that a structural lesion in the stomach is present. I may, perhaps, sum up my experience of the clinical diagnosis of these two conditions by saying that when, with great confidence, I make the diagnosis of duodenal ulcer from the clinical history alone, I feel wounded and amazed if I prove wrong; whereas when, with a sense of pride in my courage, I make the diagnosis of gastric ulcer, I feel very contented, even a little elated, if I prove right. We turn eagerly, therefore, in all cases of gastric ulcer to other methods of examination in the hope of greater enlightenment.

Of all ancillary methods of diagnosis, that of the radiologist should be of greatest value. In the diagnosis of gastric ulcer, it has pride of place; in competent hands, it is far more accurate than any other method of diagnosis, clinical or chemical, or than all other methods combined. It is, indeed, so trustworthy that unless a diagnosis of gastric ulcer made upon clinical evidence is confirmed by the radiologist, it should rarely, if ever, be accepted. There are, indeed, only two certain and unequivocal methods of making a diagnosis of gastric ulcer—that of the radiologist and that of the surgeon. Unless a gastric ulcer is seen we can never be quite confident of its presence. We must walk by sight and not by faith. I think it is quite true to say that no merely clinical diagnosis of any condition is so apt to be fallacious as is that of "gastric ulcer." Yet cases are met with very frequently in which this diagnosis has been made upon the flimsiest clinical evidence. When such a diagnosis becomes the warrant for medical treatment, when such treatment is expanded into a "system," and when statistical results of such systems are offered for our consideration and respectful admiration, we cannot but feel aghast at the mountain of falsity which looks so imposing and is in truth so unreal. Until we have learnt far more than we know at present, might we not resolve to apply the term "gastric ulcer" only to cases in which the diagnosis is certain, and to judge of the efficacy of therapeutic methods, and of the pathological destiny of the lesion, only in such proven cases?

The radiological evidences of ulcer have been described fully by Carman and others. The niche or accessory pocket has been well seen in exactly one-third of our cases; the abiding spasm of a zone in the stomach, the "notch" on the greater curvature, seen with or without the crater, indicates, just as certainly as the niche, the presence of an ulcer. The condition of the stomach in respect of its general muscular tone is now always observed; it is interesting to find that the orthotonic, the hypotonic, and the hypertonic types occur with exactly equal frequency in cases in which a gastric ulcer has been proved to exist. In cases of duodenal ulcer an orthotonic condition was found in 44 per cent., a hypotonic in 24 per cent., and a hypertonic in 32 per cent. Deformities of the duodenal bulb are as certain an evidence of ulcer as are the niche and notch in cases of gastric ulcer. When stenosis has resulted from the firm healing of an ulcer, whether in the stomach or duodenum, or both, the radiological examination reveals the clearest proof of the conditions present.

TREATMENT

This may be either medical or surgical. Before attempting to assess the value of medical treatment of either form of ulcer, it is essential to know whether an ulcer is indeed present. This seems, perhaps, a foolish and unnecessary qualification. But a not inconsiderable acquaintance with the literature of this subject, and friendship with many authors of eponymous methods of treatment leave me in considerable doubt as to whether this necessity is even to-day adequately recognized. It is improper and untrustworthy to speak of the results of treatment of gastric ulcer if we are not sure that an ulcer is certainly present before treatment begins. No small part of the literature of this subject is encumbered with error and, what is worse, with half truths.

Failure to observe this principle of verification is not solely the prerogative of the physician. I have operated many times upon patients who have had gastro-enterostomy performed for ulcers and have been unable to find any slightest trace of the supposed lesion. They were often cases in which symptoms never warranted a diagnosis of ulcer. There can be no doubt that operations are done in many parts of the world by incompetent surgeons on grounds which are quite indefensible. Before either medical or surgical treatment is adopted, the existence of the ulcer should, therefore, be indisputable. For such accuracy in diagnosis, clinical and radiological methods will be fully adequate.

Here let me affirm that medical treatment should in every case of gastric or duodenal ulcer have a fair opportunity of assisting healing in the ulcer. The problem, however, is not a simple one. I have watched the rate of healing of gastric ulcers in certain cases upon which, during operation, I have found an ulcer near the cardia, there, perhaps, so large or so adherent or both, that a resection would involve complete ablation of the stomach. In such cases I have performed jejunostomy alone, or jejunostomy combined with gastro-enterostomy. Feeding through the tube was carried on until the ulcer appeared, on radiological examination, to be healed. The longest period occupied in healing was three years and nine months, in a patient sent by Sir James Mackenzie. An ulcer the size of a shilling needs a period of about six months for its firm cicatrization. The periods stated to be adequate by McLean and others are, I think, fantastic.

These authors record (*Lancet*, 1928, i, 14) the case of a woman aged 30 who, examined on October 28, 1927, was reported to have "a very large penetrating ulcer of lesser curvature." She was given alkaline treatment and, on November 17, less than three weeks later, the report was that "no ulcer was seen," the health was good and there was neither dyspepsia nor epigastric tenderness.

Such claims do not receive the slightest support from any evidence derived from my much larger series of cases.

Before medical treatment is begun we must be satisfied that no possible sources of infection are present. It is necessary to examine the teeth very carefully, by X-ray also, and to repair any defect; and nasal sinuses must be examined. One of the disadvantages of medical treatment lies in the fact that intra-abdominal sources of infection—the appendix, for example—cannot be discovered and cannot be eradicated without operation, and treatment is, therefore, greatly handicapped.

Medical treatment must be carried out upon sound lines. We are compelled to realize that this raises a problem not only medical but financial, and in no small degree domestic. The physician or general practitioner really has to labour under many heavy disadvantages. The first is that the symptoms of these diseases are rapidly assuaged or even removed by a few days' care in diet, or rest in bed. The patient soon displays evidence of weariness, or even rebellion, at restrictions which then appear to be quite unnecessary, when health seems restored and pain has gone. But concessions cannot properly be made. Rest in bed may not be essential to encourage healing, but it is at least extremely helpful, and the more complete the rest, the more successful and the steadier is the treatment likely to be. Rest here as elsewhere should be regarded as almost paramount.

There has recently been revived a considerable enthusiasm for " alkaline treatment." This is an old practice revived by those who

> " labouring for invention bear amiss
> The second burthen of a former child."

When I was a student the triple carbonate powder was an everyday prescription for the sufferers from " gastric ulcer." As a very large proportion of such patients did not possess a gastric ulcer, it was a remedy regarded rather as a source of comfort than as an inciter of healing. When, however, we realized that in gastric ulcer the acid content of the gastric juice was often low, whereas it was high in cases of duodenal ulcer (the diagnosis of which we had then made possible) we found that regular administration of the powder in the latter disease gave a considerable measure of relief, regarded even as " cure," for months or years. I give here a table compiled from the records of a small number of cases in which gastric acidity was measured.

	Gastric Ulcer.		Duodenal Ulcer.	
	Per cent.		Per cent.	
Achlorhydria - - -	13·1		5·5	
Hypochlorhydria - -	15·7		4·1	
Low normal - - -	18·4		12·8	
Normal - - - -	34·2		5·5	
High normal - - -	15·7	20·9	24·2	72·7
Hyperchlorhydria - -	5·2		48·5	

I have selected them because the examinations were all made by the same chemist, who was then in my private service.

The value of the "triple carbonate" in cases of duodenal ulcer might at once be expected to be considerable. The use in gastric ulcer is, so far as I can judge, considerably less valuable, as also we might foresee.

Our chief reliance then should be placed upon rest, diet, climate and other methods which require time, circumstance and opportunity for their adequate fulfilment. The great disadvantages under which medical treatment labours are therefore obvious. The vast majority of our patients cannot afford adequate rest, the hospitals have no beds to spare for those not requiring more active treatment; the quick relief from symptoms which comes from slight changes in diet, the unrest of the patient, all these circumstances militate against a recognition of the supreme necessity of untiring care in respect of every detail of treatment. What should be our diet chart for these two groups of cases, the gastric and the duodenal, after the first stage of treatment is over? I think the same diet may safely be given to both; but the "triple carbonate" only to those in whom a high acidity has been revealed by the test-meal. To all patients charts similar to the following should be given :—

DIET CHART : *For patients who have passed the first stage in the medical treatment of gastric or duodenal ulcer, or who have undergone operation.*

Breakfast	Cream of wheat, sugar, cream. Lightly boiled or poached egg. Steamed fish, fried fish with "crust" removed. China tea, weak. Marmalade or other "Tiptree" jelly. Bread one or two days old, and if toasted only lightly browned. Fresh butter freely.
10.30–11.30	About 5 to 10 ounces of milk or Vichy water with a small teaspoonful of "triple carbonate," for all in whom gastric acidity is high.

1 p.m., *Lunch*	Potato soup or other milk vegetable soup. Fish as at breakfast, butter sauce, sweetbread, calf's head, tripe, chicken, mashed potatoes, vegetables through sieve, minced fresh meat. Any form of well cooked milk pudding, Junket, Castle pudding, Italian cream, Jellies. Biscuit and butter.
3.30 *p.m.*	As at 10.30 a.m.
4.30–5 *p.m.*, *Tea*	Weak China tea, cream, thin potted meat or fish sandwich, without salt or flavouring. Sponge cake.
7.30–8.30, *Dinner*	Like Lunch.
10.30–11 *p.m.*	As at 10.30 a m., but a full teaspoonful of "triple carbonate."
By the bedside	Boiled milk, with "triple carbonate" to be taken if wakened by hunger.
Drink	Preferably Vichy not very cold. Water with Vichy powders equally satisfactory.

GENERAL INSTRUCTIONS AND PROHIBITIONS

(1) Have your teeth attended to by a dentist regularly every six months.

(2) Eat slowly and chew very thoroughly.

(3) Avoid tobacco.

(4) It is well to avoid all form of alcohol. If greatly desired a small quantity of light wine or whisky diluted with soda water may be taken at meal times. Avoid all effervescing drinks. Of clarets, Chateau Carbonnieux is best.

(5) All patients with high acid curves should avoid all fruits which are acid. The skin or pips of all fruits (whether raw, cooked, or in jam) should be removed. Avoid currants, raisins, lemon peel, nuts and figs. Orange juice, with carbonate of soda sufficient to neutralize all acid, may be taken occasionally.

(6) Avoid all raw vegetables, whether taken alone (celery, watercress) or in pickles or salad. Green vegetables must be passed through a sieve and mixed with butter in the form of a *purée*. Porridge is only allowed if made with the finest oatmeal. "Cream of wheat" may be taken with cream and sugar. Sliced tomatoes with plenty of salad oil may be taken twice or thrice weekly.

(7) Avoid vinegar, lemon juice, sour fruit, pepper, mustard, curry, chutney, new bread, tough meat, meat cooked a second time, salted fish or meat, pork, "made-up" dishes, high game, clear or thick meat soup. Salt if taken at all must be in very small quantities only.

(8) Take plenty of butter and cream. A dessert-spoonful of olive oil before each meal is of value.

When the X-ray shows that the ulcer is healed, and that no undue deformity persists, it is essential to urge a long-continued care in the matter of diet, general conduct of life, and especially, perhaps, supervision of alcohol and tobacco. Tobacco is "the worst enemy" of patients suffering from duodenal ulcer. In these cases the acid content is often high; it plays a part no doubt in the development and perpetuation of the ulcer; it is increased by smoking. Many years ago I first pointed out the harm done to those suffering from duodenal ulcer by tobacco. And to clear up the difficulty I had a large number of test-meals taken upon students, at the time when they were smoking, and compared them with others taken when tobacco had not been used for three or four hours. Tobacco always increased the amount of hydrochloric acid, or excited a prolonged secretion.

CONCLUSIONS

(1) Ulcers of the stomach or duodenum do heal, and remain soundly healed for years.

(2) When healed, stenosis in the body of the stomach or in the duodenum may result, and surgical treatment for a mechanical deformity then be necessary.

(3) Medical treatment should always be given a first and a second trial; if it then fails, success in later efforts is extremely improbable.

(4) The present methods of medical treatment are proved by experience to be of little value, and are highly dangerous. The majority of patients who die from either of these diseases succumb because medical treatment has failed to relieve them. Medical treatment undoubtedly has a mortality greatly exceeding the highest mortality following any surgical procedure adopted for chronic ulcers of the stomach or duodenum.

(5) The failure of medical treatment is largely due to its insufficiency. To be successful such treatment must be rigorous and protracted. The loyal co-operation of the patient is essential. Very few patients now receive any treatment offering a reasonable prospect of healing of the ulcer.

(6) When medical treatment has failed, surgical

treatment must be adopted, and should not be delayed.

(7) Experience shows that surgical treatment, adopted when medical treatment has failed, is far less dangerous and far more effective in attaining our object than medical treatment; the immediate and remote mortalities are smaller, the after-effects far more satisfactory.

(8) The failures of operative treatment by competent surgeons are due chiefly to the development of fresh ulceration at the new anastomosis.

(9) The causes of this new ulceration lie partly in the diathesis of the patient, and partly with details of the operation.

(10) Surgical treatment should consist in the eradication of the ulcer or ulcers; by gastrectomy if the ulcer lies in the stomach; by a short-circuiting operation combined with destruction of the ulcer when it lies in the duodenum. Balfour's method and Walton's method have proved excellent in the hands of their authors. Other complementary procedures within the abdomen must be observed.

(11) Gastrectomy in the treatment of duodenal ulcer is more dangerous than gastro-enterostomy, and does not appear to give any better late results, if, indeed, its results are so good. It should, therefore, have no place among surgical methods for the treatment of duodenal ulcer at the present time.

(12) The medical treatment of gastric ulcer and of duodenal ulcer is, perhaps, not so much a medical problem as a problem in social economies. Rest in bed, freedom from anxieties, abstinence from work, complete repose, in fact, are essential if treatment is to have the best chance of success. A counsel of almost unattainable perfection.

(13) The connection between gastric cancer and gastric ulcer is so clear that gastrectomy alone, wherever it is practicable, should be regarded as the appropriate surgical treatment for chronic incoercible gastric ulcer.

Infections of the Hands and Fingers

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IT would be difficult to over-estimate the importance of acute infections of the hands and fingers. They are relatively common conditions, because our hands, being unprotected, as they so often are, by artificial coverings, are constantly liable to minor trauma, and to influences which are potential sources of infection. In view of the possibilities the wonder is that hand infections are not more frequent.

The origin.—When we ask ourselves how the infection enters the part we naturally think of wounds and of surface abrasions, but we do well to remind ourselves that around our nails there are areas peculiarly liable to act as avenues of infection, apart from the possibility of trauma, cul-de-sacs and sulci which constantly harbour organisms, arrangements of delicate epithelium so easily damaged unless certain simple precautions are taken. There is no doubt that the nail areas are among the most frequent sites of origin of hand infections, and so far as the bacteriology is concerned, the staphylococcus and the streptococcus are the common agents.

The clinical considerations.—In discussing the clinical bearings of hand infection it may be convenient to subdivide the errors into groups, adopting a classification appropriate to the individual parts in which the infection is manifest. On this basis I propose to review : (*a*) infections around the nail; (*b*) infections of the finger pulp; (*c*) infections of the thecæ or tendon sheaths; (*d*) infections of the hand spaces.

INFECTIONS AROUND THE NAIL

The evolution of the human nail is an interesting question. Phylogenetically nails are hairs glued together by a collagenous material, and morphologically they represent the hoofs and the claws of the lower animals. As body structures they are so familiar that it may seem unnecessary to elaborate their structure and arrangement, yet there are certain details of considerable surgical significance which it is well to remember. The nail-plate rests upon the underlying column or nail-bed, the two structures being intimately related, though a plane of cleavage exists. The nail edges are bent at a right angle to the plane of the nail-bed, so that a convex surface is presented to the adjacent skin, and a further protection is afforded at the line of contact by the existence of a ridge of cornified epithelium. The arrangements are thus designed to prevent damage of delicate epithelium by a rough or irregular nail edge. The base or root of the nail is embedded in an epithelial sulcus, and from the overlying skin a thin and delicate pellicle—the eponychium—extends over the free surface of the nail-plate. As the nail grows the eponychium, if adherent, tends to be so stretched that it splits and tears, leaving " ragæ "—a frequent error in the fingers of those who are careless about the hygiene of their hands. At the nail edges and in the eponychium therefore we find such tissue arrangements as facilitate abrasions with their attendant risks. Infections involving the nail are conveniently grouped under the term " paronychia."

The infection may be introduced by way of a wound of the nail-bed, as when a spicule of wood is driven underneath the nail; more frequently the source is an abrasion of the epithelium at the nail edge or a tear of the eponychium. Once originated, the process tends to spread, and, if neglected, the likelihood is that the infection makes its way beneath the nail-plate into the substance of the nail-bed. Paronychias, whatever their type and origin, are always painful, but the symptoms are exaggerated when there is a subungual spread owing to the greatly increased tension in this area. It is unnecessary to enlarge upon the clinical picture—the ceaseless painful throbbing, the red and œdematous finger-tip, the swollen nail-fold and eponychium, the purulent discharge oozing from beneath the eponychium.

Treatment.—Nail infections are not, as a rule, serious. They are painful, debilitating, and often intractable, but they rarely endanger life or limb, because their relationships are such that they do not readily establish communication with the more important areas of the tendon sheaths, the palmar spaces or the bones. When called upon to treat the error one of the main anxieties is to prevent infection from passing beneath the nail-plate, for, if this extension ensues, our difficulties are immensely increased.

The principles of treatment may be summarized as follows. Unless pus formation exists, it is a mistake to incise the parts; no real benefit is achieved, but on the contrary tissue spaces are opened up which may lead to an extension of infection. In the early stages, therefore, we content ourselves with such conservative measures as the application of a narrow Bier's congestive bandage around the finger base, and the application of heat to the part through the medium of hot finger-baths or hot fomentations, the former for preference. It may be that by these means pus formation is avoided; if so, well and good, but as soon as suppuration has occurred it should be released by an appropriate incision. How should the part be incised? In such a way as to secure a sufficiency of drainage and yet preserve the future function of the tissue. In practice the detail is as follows. Suppuration at the eponychium is incised by a flap incision (Fig. 1) so designed that the integument overlying the nail-root is uplifted so as to permit the introduction of a narrow rubber

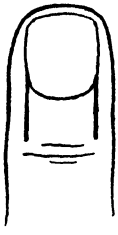

FIG. 1.—Incisions for suppuration about nail-bed.

tissue drain. Pus formation at the nail edge is released by an incision parallel to the long axis of the nail, but so placed as not to damage the protective cornified ridge. How shall we act if suppuration is extending beneath the nail into the nail-bed? It is rarely necessary to remove the nail-plate. Pus formation in this situation extends slowly because of the physical resistance offered by the tissues, and if the progress of events is carefully observed, a local release of pus is secured while the suppuration is still confined to a small area. To remove the entire nail-plate while the pus formation is limited is a harmful and barbarous procedure, for not only is it unnecessary, but it exposes fresh tissue to infection, and may result in permanent disfigurement of the finger tip. Our procedure is to remove by means of a small, strong, sharp-pointed scissors that portion of the nail-plate which overlies the pus collection. The after-treatment of nail infection implies the continuance of hot antiseptic finger-baths, of hot fomentation in the intervals of bathing, and of Bier's congestion. As soon as the infection has subsided a mild astringent antiseptic, such as acriflavine (1 in 1,000), is an appropriate dressing.

INFECTIONS OF THE FINGER PULP

These are not as frequent as nail infections, but they have certain aspects which render them potentially more serious. They may arise as a spread from an infected nail-area, but usually there is a history of an abrasion or a puncture wound of the tissues. Following the inoculation there is a development of inflammation with the usual features of pain, swelling, and redness. In the majority of cases suppuration ensues, for the tissue in this area is evidently lacking in any high degree of resistance. As suppuration develops, it may be localized beneath the superficial layer of the epithelium, forming a subcuticular whitlow or a purulent blister, or it may extend beneath the integument to form a subcutaneous whitlow.

The subcuticular whitlow is not a serious affair unless it penetrates to a deeper level. In its treatment, it is sufficient to remove the cuticular layer of the blister and to apply an antiseptic moist dressing. The subcutaneous infection, on the other hand, may be a matter of great consequence. Let me recall certain anatomical facts relative to the finger pulp. The deep surface of the skin in this area is related to the periosteum of the underlying terminal phalanx by thin, cordlike bands of fibrous tissue, the relatively large amount of subcutaneous fat in the finger pulp is sharply limited proximally by the close relationship between the underlying tendon sheath and the crease of the distal interphalangeal joint, while the digital artery, in passing to supply the finger tip, gives off a small nutrient vessel which enters the base of the first phalanx (Fig. 2).

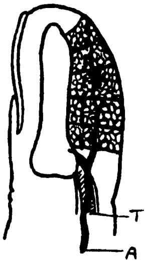

FIG. 2. Structure of the finger pulp. Site of incision in cases of subcutaneous whitlow indicated by dotted line. T = tendon. A = artery.

Now, recalling these points, imagine for a moment the position which is liable to arise in the presence of a spreading infection of the finger pulp. For a time the laxity of the tissues permits considerable swelling, but, if this continues unchecked, the tension ultimately reaches a point at which complications are liable to occur. Under the increasing tension the infection extends to a deeper level, mainly along the fibrous strands which connect the deep skin surface with the underlying phalanx. It is by this means that infection of the phalanx tends to complicate sepsis of the finger pulp. Of greater consequence, however, is the effect of the increasing tension on the related blood-vessels. As the digital vessels pass under the terminal interphalangeal crease to enter the finger tip they are submitted at this point to a certain amount of increased pressure, even under normal conditions, but when the finger pulp is the site of infection with its greatly increased tension, the pressure on the vessels is augmented, and it is believed that the interference may become so serious that the nutritional supply of the phalanx is endangered. This supposition is, perhaps, more theoretical than real, but, judged by anatomical standards, it must be regarded as a possibility, and it is therefore worthy of mention.

The clinical features of finger-pulp infection have no special distinctions apart from their liability to be associated with involvement of the underlying bone. There is the throbbing pain of increased tissue tension, swelling, and tenderness to pressure. How should such a development be treated? To begin with, we employ the simple conservative measures outlined in connection with nail infections, and when we are satisfied that the infection is localized, and that pus formation is occurring, the part is incised and drained. The best incision is probably one which outlines a U-shaped flap (Fig. 3), a narrow, sharp-pointed bistonry is passed transversely through the tissues in front of the phalanx at such a level as to run no risk of damaging the phalangeal attachment of the flexor tendon and its theca. From this point of transfixion the incision is carried parallel to the long axis of the finger towards the finger-tip. The flap so outlined is lifted gently upwards, a narrow portion of dental rubber is passed transversely through the base of the wound, and the flap is then allowed to fall back into place. This method has certain advantages; it affords adequate drainage, there is little risk of damaging and so infecting the tendon sheath or the phalanx, the scar does not tend to become adherent to the bone, while the nerve endings, so essential to the healthful function of the finger-tip, are not seriously interfered with. An anterior midline incision should be avoided, as it

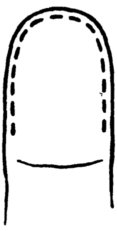

FIG. 3.
Incision for infections of pulp of finger.

is apt to be associated with one or more of the errors which are avoided by the flap method.

INFECTIONS OF THE TENDON SHEATH (THECAL WHITLOW)

These are invariably of great significance, because of the possibility that serious functional disturbance of the related finger or fingers may ensue; not only so, but the position of the infection is such that it may readily extend into other portions of the hand or forearm with correspondingly serious results.

The surgical anatomy of the tendons and their sheaths.—The sheaths or thecæ are the fibrous coverings which both protect the tendons and act as channels within which the tendons run. The sheaths may be subdivided into two groups—the digital flexor sheaths and the common flexor sheaths. The former are concerned with the finger distribution as distinct from the palmar. They extend from the bases of the terminal phalanges to the level of the distal transverse crease of the palm opposite the necks of the metacarpal bones, except those in relation to the little finger and the thumb. That of the little finger is continuous from the base of the first phalanx to the common flexor sheath, into which it opens; that of the thumb maintains an independent course from the base of the first phalanx to a point about one inch above the transverse carpal ligament, though it is true that it frequently has a communication with the common flexor sheath (Fig. 4). Each sheath or theca is composed of strong fibrous tissue arranged transversely across the long axis of the finger and attached to the lateral and medial borders of the phalanges and to the interphalangeal and metacarpo-phalangeal ligaments. Opposite the joints (interphalangeal and metacarpo-phalangeal) the transverse arrangement of the fibres is replaced by a decussating one, no doubt to permit greater facility of movement, blood-vessels perforate the decussation and—of peculiar importance—the cutaneous tissues of the creases at the distal and mid-interphalangeal joint comes into close relationship with the sheath,

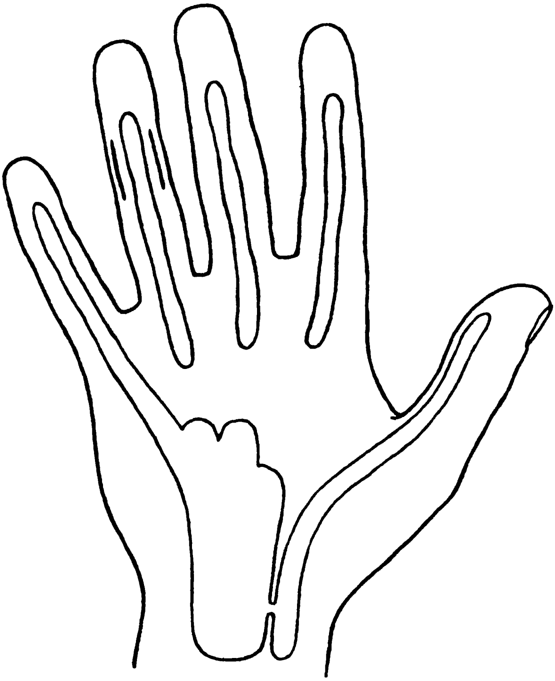

FIG. 4.—Tendon sheaths of the hands, showing lines of incision in thecal suppuration.

owing to there being virtually no subcutaneous fat at this point. In other words, if it is desirable to puncture the theca it can be done most easily by inserting the needle through the centre of one of the interphalangeal creases. It is unnecessary to insist upon the practical importance of this consideration.

The common flexor sheath lies beneath the transverse carpal ligament, it extends proximally into the forearm for a distance of about 1½ inches above the ligament, and it passes distally to the middle of the palm. The contact surfaces of both sheaths and tendons are lined by mesothelial cells, and the space which exists contains a trace of fluid derived from the mesothelial surfaces.

The clinical considerations.—Infections of the tendon or its sheath may arise in various ways, the most important of which are puncture wounds of the palmar aspect of the finger and extension of infection from the finger pulp. In regard to the former possibility reference has already been made to the structural arrangements which render infection of the tendon sheath so likely when the puncture is situated at the crease. The infecting organism is almost invariably the streptococcus, and this is so constant in this situation that it suggests that the streptococcus may have some specificity for attacking mesothelial tissue of this type. The clinical features of a tendon sheath infection are characteristic: there may be considerable general illness, the tongue is coated, the temperature is raised, and the pulse-rate increased. But what of the local changes? Note the position of the affected finger—it is held slightly flexed at the metacarpo-phalangeal joint, the other joints of the finger are held rigid and extended. An attempt to straighten the finger at its point of flexion at once induces an increase of pain. Observe also that the finger is swollen, mainly on the palmar surface, though there is also some œdema apparent posteriorly. A blunt point gently pressed upon the tendon line induces acute pain. This combination of features indicates an infection of the theca, and its associated tendon, and of the various signs the attitude of the finger and the pain induced by extension are probably the most significant.

Treatment.—Hitherto I have indicated the importance of delaying incision until we are satisfied that the infection is localizing and suppuration developing. The same principle applies in relation to tendon infection, but I would add that the need for incision and drainage arises earlier in the case of tendon infection than in the other conditions we have considered. There is the further point that undue delay in this situation is particularly harmful, because it may imply a sacrifice of the functional value or even of the life of the tendon, while infection may extend into other and more serious areas. When the time for drainage has arrived the operation entailed should be carried out through a bloodless field, and therefore a tourniquet in the form of an Esmarch's bandage, or, as some prefer, a blood-pressure armlet, is used. The incision will extend along the finger edge—whether radial or ulnar is immaterial—and it will lie anterior to the digital vessels and nerves. The incision should, if possible, avoid the creases; on the other hand, it must be so designed that full drainage is secured, and if necessary there need be no hesitation in prolonging the incision into the palm. Drainage is maintained by passing portions of rubber dam down to the opening in the theca; the drains should not enter the sheath, for, if they do, adhesions between tendon and sheath are likely to occur. Having secured drainage, we give our attention to the problem of after-treatment, a matter of supreme significance if the best functional result is to be secured. One of the most important details is to maintain a rigid asepsis. The original infection is most likely streptococcal, and it is imperative that no other type of organism shall be allowed to enter, for, if such should occur, it is certain that the infection will follow more serious lines, both in intensity and extent. For this reason I prefer to adopt a dry aseptic technique in the after-treatment of tendon infection rather than the intermittent bath or the irrigation technique. If it should be impossible to secure the aseptic ideal, an antiseptic bath (sanitas, eusol, or iodine) will be adopted. As soon as the relief of pain permits it, finger movement should be encouraged, and as convalescence proceeds a light splint is fitted to afford the comfort of support. Massage is started as early as the condition of the wound permits.

INFECTIONS OF THE HAND SPACES

Lying deeply in the palm of the hand beneath the flexor tendons there are certain spaces filled with areolar tissue, areas in which infections are apt to localize. It is true that many anatomists dispute the advisability of giving such spaces the dignity, so to speak, of anatomical recognition, but in so far as palmar infection tends to localize within certain circumscribed areas, and these areas are capable of definition as planes containing areolar tissue, we are justified in assigning to them some degree of surgical significance. Two of the spaces exist in the palm, a third extends into the lower part of the forearm. The palmar spaces are the thenar and the mid-palmar; the former is medial to the long flexor tendon of the thumb and lateral to the middle metacarpal bone, its posterior boundaries are the adductor muscle of the thumb with the first dorsal interosseus muscle, while its superficial relations are the superficial short muscles of the thumb, the flexor tendon of the index finger, the two outer lumbrical muscles and a portion of the palmar aponeurosis. The mid-palmar space lies to the inner side of the middle metacarpal bone, but lateral to the hypothenar muscles, its deep relations are the interosseous muscle and the metacarpal bone, its superficial relations are the flexor tendons of the third, fourth and fifth digits. From the distal end of both spaces there are small tubular diverticula or lumbrical canals which extend distally towards the finger webs, where they lie in relationship to the thecal sheath of adjacent tendons. The third of these spaces, sometimes known as Perona's space, lies beneath the deep flexor tendons, but superficial to the pronator quadratus muscle, and extends from the level of the transverse carpal ligament into the forearm for a distance of about two inches.

Methods of infection.—Infection of these spaces is usually the result of a puncture wound of the palmar tissue overlying the respective space. There is another method of infection, however, which we do well to keep in mind; a thecal whitlow may extend beyond the tendon area, and, entering a lumbrical canal, may thence extend into the thenar or the mid-palmar space.

Clinical features.—It is appropriate to illustrate the clinical features of the various types of "space" infection by individual case histories.

INFECTION OF THE THENAR SPACE

A patient, a butcher by trade, ten days previous to admission to hospital, sustained an infected wound of the front of the left thumb. A tendon infection ensued, which was incised and drained by his practitioner. The condition progressed favourably until four days later, when deep throbbing pain was complained of in the radial half of the palm. The thecal infection of the thumb had extended into the thenar space, and it was instructive to notice the features which the hand demonstrated. There was evident general illness, as shown by his appearance, the furred tongue, and the rise of body temperature. The palm of the hand was considerably swollen in its outer or radial half. The swelling was evident on the palmar aspect, but it was more pronounced on the dorsal aspect in the space between the first and second metacarpal bones, because here there is greater tissue space in which œdema may occur. Both the thumb and the index finger were held somewhat stiffly, but slightly flexed at the metacarpo-phalangeal joints, and any attempt at extension of the digits caused an exacerbation of pain in the palm, probably because such a manœuvre increases the tension in the infected space. When local pressure was exerted with a blunt point over the swollen area, there was a point of maximum tenderness midway between the metacarpal bones of the thumb and index fingers about one inch below the web. It was evident that, although pressure on the corresponding dorsal aspect elicited pain, the posterior point was much less sensitive. The signs were those of a thenar space infection.

THE MID-PALMAR SPACE

A woman punctured the palm of the right hand with the point of a knitting needle. An infection of some severity must have been conveyed along the tract, for within twelve hours of the injury she complained of pain in the centre of the palm. On the following day she consulted her practitioner, who advised hot fomentation treatment, and this was continued for several days. The existing signs indicated that there was an acute infection of the mid-palmar space of the hand. There was some swelling of the hollow of the hand, not pronounced, because it was controlled by the strong overlying palmar fascia, but the back of the hand was intensely swollen. The index, middle and ring fingers were held together and slightly flexed at each joint. This attitude is adopted to relax the palmar tissues and particularly the deep flexor tendon immediately overlying the infected space. Pressure over the palmar swelling at a point to the ulnar side of the middle metacarpal bone induced marked tenderness. Pain could also be induced by more indirect means, by extending the flexor fingers, no doubt because such a manœuvre increases the tension within the palmar space.

The sequelæ of untreated space infections.—In the case of the thenar space the infection tends to make its way either towards the web between the thumb and the forefinger or towards the base of the index finger, eventually pointing in the web between index and middle fingers or more rarely invading the tendon sheath of the index finger. Mid-palmar space infection may appear superficially at the webs between the middle, ring and little fingers (Kanavel), but more frequently the suppuration extends centrally to invade the space which lies ventral to the pronator quadratus beneath the deep flexor tendon, thence extending into the forearm.

The treatment of hand-space infections.—It may be stated as the general rule that when a hand-space infection is sufficiently definite to be recognized as such the time has arrived when incision and drainage should be employed. It is proper, however, that in the early stages of the infection treatment should follow the conservative lines which have already been discussed in relation to infections in other parts of the hand and fingers, but the hand incision must not be delayed unduly in case the pus should make its way into areas such as the forearm, where serious damage to highly-important structures may ensue.

Incision for drainage of the thenar space.—We have found that an appropriate incision through which the thenar space may be entered is one which runs in the web between the thumb and the forefinger (Fig. 5). It must not extend on to the forefinger in case the radialis indicis artery be damaged, and it therefore should occupy the middle third of the web. The position of the princeps pollicis artery is such that it is most unlikely to suffer damage. Through the incision a dressing or sinus forceps is passed so that it is carried parallel to the axis of the metacarpal bone of the thumb for a distance of about 4 cm., the track being superficial to the adductor group and deep to the abductor and flexor brevis. Drainage is secured by means of a strip of soft dental rubber. If for any reason insufficient drainage seems to result, an additional point of entry is made by an incision across the long axis of the web between the index and mid fingers. The incision is carried towards the palm for a distance of 2·5 to 3 cm. (Figs. 5 and 6), and a dressing forceps passed through it, but carried in a slightly radial direction, enters the thenar space.

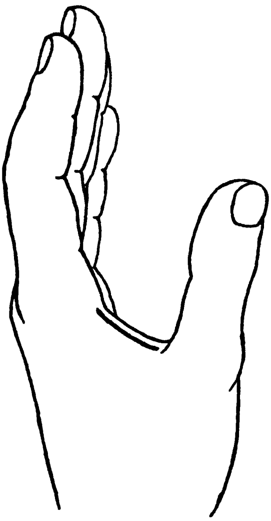

FIG. 5.—Incision for thenar space infection.

Incision for drainage of the mid-palmar space.—Drainage of the mid-palmar space is secured by incision at right angles to the webs between the little, ring, and mid fingers, and occasionally between mid and index fingers. The incisions should extend for some distance into the palm, but they must not extend up to the level of the mid-palmar crease in case of damage to the superficial palmar arch. The exploring forceps are passed parallel to the adjacent metacarpal bone except between the index and middle fingers; in this instance the forceps should cross the metacarpal bone of the mid finger obliquely towards its ulnar side. Drainage is secured in the usual way by strips of dental rubber (Fig. 6).

The after-treatment of hand-space infections is conducted on the lines indicated in relation to tendon infection, and, as in that instance, our choice is in favour of a dry aseptic technique in preference to wet dressings and antiseptic baths.

Some details of after-treatment.—The following points include the more important essentials :—(*a*) Observe the most scrupulous care in the aseptic or antiseptic technique which the wound demands; (*b*) encourage active movements of the various joints from the moment treatment is begun; (*c*) as soon as the state of the wound permits it, institute massage and passive movements of the parts; (*d*) when the acute stage has subsided and the amount of dressing is relatively small, a splint may be applied in order to prevent acquired deformity.

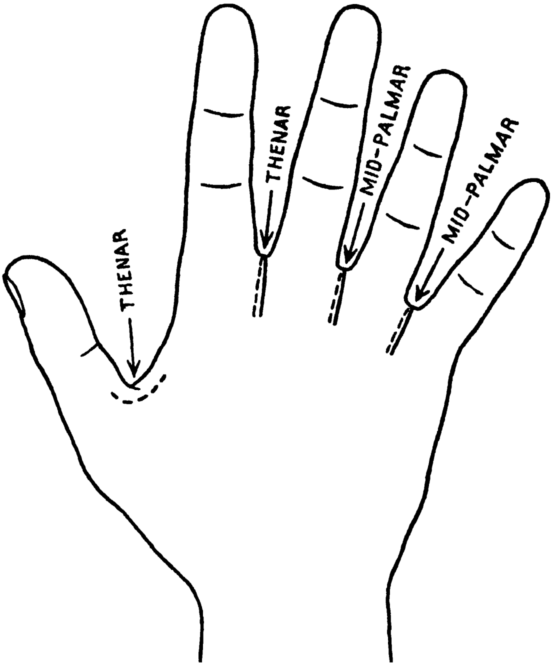

FIG. 6.—Incisions for thenar and mid-palmar space infections.

These are some of the considerations of a group of surgical affections the importance of which it is difficult to exaggerate. It is true that we are sometimes inclined to consider hand infections as trivial in their significance, and that this is shown by their inclusion under the category of minor surgery. When we appreciate how serious are the disasters which may follow in their train we realize our responsibilities.

The Treatment of Pleurisy

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PLEURISY is a very definite pathological condition, though it should not be regarded as a clearly defined clinical entity, in spite of the fact that the term is often employed and accepted as a diagnosis. The reason for this is, that though pleurisy is rarely primary, being as a rule secondary to some more widespread or deeper disease or infection, yet it produces a definite group of symptoms, which often overshadows and sometimes conceals the primary condition, indeed the subjective manifestations are not infrequently so positive and painful that they compel immediate treatment. A diagnosis of pleurisy should not be regarded as sufficient without some qualification, indicating the cause or origin of the inflammatory condition of the pleura. There is a further reason for making the diagnosis of pleurisy more explicit. A history of pleurisy in a proposer for life assurance, especially if he be of light build, or have a definite family history of tuberculosis, may act prejudicially on his acceptance, unless the nature of the pleurisy is definitely stated. The main reason, however, for the most careful investigation into the causation of every case of pleurisy is the importance of treating the primary condition underlying the inflamed pleura, in addition to giving relief to the painful symptoms. Failure to do this sometimes leads to serious consequences, notably to the development of serous effusions and active tuberculosis, to unrecognized or neglected empyema, or to delay in treating effectively atypical cases of true pneumonia.

Classification.—The most convenient classification is partly clinical and partly pathological:—

Acute:
- (1) Dry Pleurisy.
- (2) Pleurisy with effusion:
  - (*a*) Serous.
  - (*b*) Sero-purulent.
  - (*c*) Purulent.
  - (*d*) Hæmorrhagic.

Chronic:
- (1) Chronic dry pleurisy.
- (2) Chronic effusions.
- (3) Chronic adhesive pleurisy.

Treatment.—It should, however, be recognized that, though useful, especially from the point of view of treatment, this classification is artificial, since most of these conditions are stages in a process of varying degrees of intensity, extent and virulence, so that the condition may cease at the dry stage, that is when there is little inflammatory effusion, only sufficient to form the false membrane, or exudate on the inflamed serous surfaces, or it may proceed to the pouring out of a large quantity of clear serous fluid of inflammatory character or to turbid sero-purulent fluid and eventually to definite pus, either at once or late in the course of the case, depending upon the nature of the organism and the degree of its virulence. The treatment of pleurisy must therefore depend upon the cause, the stage, the intensity, and the extent of the process.

DRY PLEURISY

The pain of pleurisy, especially when it affects the lower part of the pleura, is very severe, and when it involves the diaphragm it is usually excruciating. A diagnosis can be made with certainty if definite friction is heard, but friction is usually inaudible in diaphragmatic pleurisy and sometimes it is very difficult to distinguish superficial, intra-pulmonary râles from fine crepitant friction. It is curious in this connection that there may be little or no pain with coarse, grating friction, so rough that the patient may be conscious of a rub, or even hear it, while a fine superficial crepitant friction may be associated with intense pain.

The diagnosis of dry pleurisy, from pain arising in or referred to the thoracic wall, such as the conditions comprised under pleurodynia, including fibrositis, myalgia and intercostal neuralgia, is often difficult, the more so that in the first of these conditions superficial creaking sounds may be heard. These can usually be distinguished, since they are not related to the respiratory movements and are easily produced by movement of the scapula.

The causes of acute dry pleurisy are pneumonia, tuberculosis, septicæmia, rheumatism, new growths, especially malignant forms, and extension from disease of adjacent structures, e.g. the lung, the pericardium, the mediastinal contents, including the bronchial glands, and from sub-diaphragmatic conditions. It often results from injury such as fracture of the ribs.

Every case with thoracic pain should be treated seriously, particularly if it be associated with cough and fever. A diagnosis of pleurodynia should not be made until pleurisy has been excluded. The patient should go to bed and keep to a light diet while the necessary investigations are being made. If fever be present, the nursing should be as for a case of pneumonia, the room being well ventilated and kept at a temperature of 60–65° F. Since breathing is usually very painful, the patient should be in the position found to be most comfortable. This may be lying flat on the back, so as to hinder diaphragmatic breathing and favour shallow upper costal respiration, or the patient may find most ease by lying on the sound side at first, thus avoiding pressing the inflamed surfaces together. Later, lying on the affected side may be more comfortable by limiting the movement of the lung on that side.

The two symptoms which call for treatment are pain and cough. Pain may come on suddenly and may be of such severity as to produce shock or collapse, particularly when the causal condition is pneumonia, or where the diaphragm is involved. It is usual to try local treatment for the pain in the first instance; e.g. hot applications, poultices, antiphlogistine or turpentine stupes are much favoured. Painting with tincture of iodine (the mild form) or the application of liniments like linimentum terebinthinæ aceticum, or liniment A.B.C. (aconite, belladonna and chloroform) is sometimes employed. A useful application is menthol, dissolved in an ounce of chloroform liniment, in the proportion of one or two drachms to the ounce, sprinkled on warmed lint, bound or strapped over the painful area. Dry cupping is sometimes employed. As in other painful conditions, the application of leeches or flying blisters may give great relief. Strapping the chest wall is sometimes employed, though not as frequently as formerly, except in cases associated with broken ribs. In other cases, if strapping is employed, it should be removed after a day or two, to allow of examination and to permit the lung to expand.

In many cases all such measures fail to give relief to the pain, especially when it is aggravated by the short dry cough, so commonly present. It may then be necessary to give some strong sedative to relieve the pain and to lull the respiratory centre. In very severe cases it is best to give an injection of morphine at once. There is an old prejudice against giving morphine to patients with pneumonia. There can be little or no objection to its use in the early stages, before there is much expectoration. Caution is necessary in the later stages, when the respiratory centre is becoming insensitive. In many cases, heroin or codeine may suffice, either as an injection or as a linctus. After the acute pain has been lessened, pyramidon, aspirin, cibalgin or other analgesic powders or preparations may be useful.

In very severe cases, when other measures fail, the introduction of air into the pleura by an artificial pneumothorax apparatus, in quantities sufficient to separate the inflamed surfaces, has been recommended. Recently this method has been employed even in cases with pneumonia, as a primary means of treatment. Further treatment in cases of dry pleurisy must be adapted to the underlying or causal condition.

PLEURISY WITH EFFUSION

Although the dry stage of most cases of pleurisy with effusion is associated with pain and cough, these may be slight and they are often ignored by the patient, so that the practitioner is sometimes only consulted when severe malaise, fever and dyspnœa urge the need of advice and when physical examination may show unequivocal indications of fluid in one or both pleural cavities.

On the other hand, a case starting with acute pain and cough during the dry stage, may with the development of fluid, show a notable amelioration, which may be misleading, unless the temperature and the physical signs are carefully watched. In other cases, especially when the outpouring of fluid is rapid, or in those progressing to pus formation, there is rise of temperature increasing daily, with sweating, cyanosis and more and more dyspnœa.

The treatment in cases with fluid in the pleura, until the nature and extent of the fluid are established, is practically that for any severe infection, namely, rest in bed, careful nursing, milk diet and treatment of symptoms. All clinical means of investigation should be employed—including examination of the sputum, a blood count to reveal leucocytosis as an evidence of pus formation and, where possible, X-ray examination. Exploratory puncture is desirable in most cases and should be carried out with the same antiseptic and analgesic precautions as those employed in paracentesis. The fluid obtained should be examined cytologically and bacteriologically.

Serous effusions.—The majority of serous pleural effusions are due to tuberculosis, and the high lymphocyte proportion in the cell count, together with the failure to grow organisms render the diagnosis practically certain, though guinea-pig inoculation may be resorted to in cases where absolute proof is desired. Other cases of inflammatory serous effusions, which may be sterile, are lobar and lobular pneumonia in early stages, infarction of the lung and malignant new growth. When the serous character of the fluid has been established, the patient should be kept strictly in bed on " absolute " rest. It is usually advised to restrict fluids, but not to such an extent as to cause discomfort from thirst. Mild saline aperients or mercurials and salines are given to cause watery evacuations, and diuretic and diaphoretic mixtures may be useful.

An important decision which has to be made is whether fluid shall be removed or not. In the acute stage it is, as a rule, better not to remove the fluid, unless it increases rapidly to such an extent as to cause severe dyspnœa, or if it cause positive pressure. This may be suspected if the dullness extend above the second rib, if the mediastinum be greatly displaced, if the liver be pushed down, or Traube's area become dull. If signs of collateral hyperæmia of the sound lung, or of pulmonary œdema develop, paracentesis should at once be resorted to. In many cases where the effusion is small, the temperature may quickly subside and complete absorption occur, with rapid convalescence. On the other hand, if absorption be slow, paracentesis should be considered, especially if the fever have completely subsided, so as to facilitate absorption and allow re-expansion of the lung, which is liable to be incomplete if the lung be allowed to be collapsed too long and the visceral pleura become greatly thickened. At the same time it should be remembered, especially in cases due to tuberculosis, that the fluid serves to keep the lung at rest and may therefore be useful. It is well known that pleural effusion developing in the course of active lung tuberculosis may prove beneficial; too hasty removal of fluid is therefore to be deprecated.

Air or gas replacement of the fluid is often employed in cases of pleural effusion. It has certain advantages in that it allows all the fluid to be removed, which is not possible with ordinary paracentesis, and at the same time it prevents the too rapid expansion of the lung. It can certainly be of value, particularly in large effusions, but is not necessary as a routine procedure.

In carrying out paracentesis, careful physical examination should be made to decide where to aspirate. It should be done when the signs suggest, since fluid may be confined by adhesions in unusual situations, and in difficult cases X-ray examination may be helpful. Common situations for paracentesis are the sixth space in the mid-axillary region, or the seventh space near the posterior axillary line, or the eighth just below the scapula, which can be drawn out of the way by asking the patient to fold the arm across the chest. The skin is painted with iodine, a bleb is made by intradermic injection of 0·5 per cent. solution of novocain or 0·1 per cent. percain, with or without adrenaline, then the solution is slowly injected through the bleb, the needle being pushed gradually deeper and deeper until the pleura is reached. In about 5 minutes the aspirating needle can be inserted; this is done through the anæsthetized space, the needle being directed over the upper surface of the lower rib of the interspace, so as to avoid the intercostal artery. There are many special forms of apparatus for aspirating the fluid, such as Potain's and Dieulafoy's, but

Burrell's siphon apparatus and the three-way Rotunda syringe are simple and effective, both enabling the aspiration to be carried out single-handed. In paracentesis, unless it is done by the method of air-replacement, no attempt should be made to withdraw all the fluid, and the tapping should be stopped when cough, pain or distress supervenes.

In cases where absorption is slow, or where there is much pain, local measures of counter-irritation, similar to those detailed under the treatment of dry pleurisy, may be employed, notably such measures as cupping, blistering, or the use of leeches.

After the fluid has absorbed, convalescence may be rapid, but the lung on the affected side may be slow to expand. In every case, where the tuberculous nature of the case is established, or even if it be highly probable, the patient should be advised to spend at least three months under open-air conditions, or even in a sanatorium. When this advice is neglected, there is a strong probability of the development of active lung disease within five years. When the affected side is slow to expand, exercises to promote full re-expansion may be employed, provided there is no evidence of definite lung involvement. This may be done by blowing water from one Wolff's bottle to another or by special exercises. A simple one is for the patient to sit sideways in a chair, the sound side being against the back of the chair, with the arm over the back rail, holding on to one leg of the chair, so as to impede the movement of the sound side. Deep breaths are then taken with the result that there is increased expansion of the affected side.

Sero-purulent and purulent effusions (*pyothorax and empyema*).—Sero-purulent and purulent effusions most commonly result from pneumonia, when they may occur during its course (syn-pneumonic) or as a sequel (meta-pneumonic), or as a result of local or general pyogenic infection, generally streptococcal. They may, however, occur after pulmonary embolism, after injury or from disease below the diaphragm. Empyema also occurs as a complication of acute specific fevers, especially influenza, variola and enteric fever. Localized collections of pus may form in unusual situations. Interlobar empyema is more common than is generally recognized. Mediastinal and apical empyemata occur but are less common; in empyema in unusual or anomalous situations, the possibility of malignant growth as a cause should always be remembered and, if possible, complete radiological investigation should be carried out.

The treatment of empyema is still too often the subject of misconceptions and of ill-timed or wrongly-chosen interference. The report of the American Empyema Commission,[1] which is a medical and surgical classic, is still not sufficiently known in this country. It deserves the most careful study. When empyema is suspected on clinical grounds, or when it has been established by blood count or by exploratory puncture, the character of the fluid removed should be most carefully studied. If the fluid is definitely opaque, thick pus and—especially if pneumococci are established as the causal organism—rib resection and effective drainage are usually indicated. If, on the other hand, the fluid is thin, sero-purulent, and especially if streptococci prove to be the infecting agent, operation should on no account be performed. The fluid should be aspirated and the aspiration should be repeated when necessary, generally every second or third day, until the fluid withdrawn is definite opaque pus. Then, and not till then, should operation be performed. Before this occurs, two, three or more aspirations may be necessary.

The reason for these rules has been established by the American Empyema Commission. The presence of pus in the pleura must not by itself be regarded as indicating a localized collection, comparable to an abscess, which has to be opened and drained. In pneumococcal cases, adhesions form quickly and the pus is enclosed, consequently it can be opened and drained early. In streptococcal cases on the other hand, adhesions are slower to form and are often local at first, so that the pleura is free or at most loculated, and the condition is one of thin purulent fluid free in the pleural cavity, or partially localized in communicating areas, a condition which Tudor Edwards has happily called pyothorax. Incision of the pleura at this stage is dangerous, since it will result in an open pneumothorax with all the possible dangers of a flapping mediastinum. When, after several aspirations, definite pus is obtained, it is safe to assume that the pus is localized by adhesions, and rib resection and drainage may then be carried out.

The operation for empyema is too often regarded as a simple and easy matter. In reality it requires nice judgment and care in its performance, particularly as to the best site to ensure effective drainage. The after-care is also of great importance. The drainage should, if possible, be carried out by one of the closed or negative pressure methods, a special flanged drainage tube, like that of Tudor Edwards, being employed. This is a double tube with a large and a small channel. The latter is used to wash out the cavity by Dakin's solution or other fluid, and is closed by a spigot at other times. In washing out the pleura it is most important to remember that fluid must never be allowed to be under pressure in the cavity, owing to the danger of pleural shock, consequently the wide tube must never be used to introduce fluid, but must be left patent for the fluid introduced by the small tube as well as the pus to escape by.

Occasionally repeated aspiration may result in the cure of a localized empyema, but as a rule operation is necessary. In the rare cases of double empyema, the same general rules apply. Aspiration should be carried out on each side alternately, until that more affected is ready for operation. The other side is aspirated after operation, until the patient's general condition will permit a second operation.

The convalescent treatment after empyema should be long and careful. Where there has been marked falling-in of the chest, special exercises may be used to promote re-expansion.

Hæmorrhagic effusions.—Blood-stained effusions are not common. They may occur after injury, and if infected they require early or immediate operation. Severe inflammatory effusions may be blood-stained. This is rare in tuberculosis. It is sometimes found in effusions in association with chronic renal disease. Hæmorrhagic effusion should always suggest the possibility of malignant disease. If this is established, tapping should not be resorted to unless there is great distress or dyspnœa. In this case, gas or air replacement may be the most effective means of giving relief.

CHRONIC PLEURISY

Chronic dry pleurisy is occasionally met with. The patient may or may not have pain, but is often conscious of a localized rubbing or grating. Coarse friction may be heard on auscultation, but is often curiously fleeting, being audible one day and not the next. There is usually little or no fever and only slight malaise. The condition is probably due to tuberculosis in most cases. The treatment is similar to that for acute dry pleurisy, but if there are definite indications of tuberculosis, sanatorium treatment may be advisable.

Chronic effusions may be either serous or purulent, and in rare conditions may be cholesterol-laden. Chronic serous effusions are generally tuberculous. If they are not causing symptoms, it may be well to leave them; on the other hand, air replacement may be tried and is sometimes effective.

Chronic purulent or puriform effusions may also occur in tuberculosis. These are sometimes helped by paracentesis and washing out with some antiseptic solution like mercurochrome or weak methylene blue. On the other hand, if not too large they may be left alone, since gradual absorption with re-expansion of the lung may occur.

Chronic or neglected empyema is a difficult problem, often requiring long and very carefully devised surgical treatment, to secure re-expansion of the lung or falling-in of the chest wall.

Chronic adhesive pleurisy or pleural adhesion and thickening is a common result of pleural inflammation, whether due to tuberculosis, pneumonia or empyema. The chief symptom is a dragging or aching pain, often worse in wet weather and sometimes apparent on effort or on violent movement of the arm and shoulder girdle. It does not as a rule require treatment; if severe, analgesic applications or diathermy may be employed. Exercises may also be helpful.

Reference

[1] *Journ. Am. Med. Assoc.* 1919, lxxi, 366, 443.

Seasonal Hay Fever

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THERE still appears to be a certain amount of uncertainty as to exactly what clinical conditions are to be included under the term hay fever. But in view of the clear implication in this title that the disease is connected with plant life and its active spring and early summer growth, there is much to be said for confining it to the seasonal type of disease alone. Non-seasonal spasmodic rhinorrhœa, although it may be clinically almost identical during the actual attacks with the seasonal type, can be shown, in different individuals, to be due to hyper-sensitivity to a great variety of allergens, in fact, to any of those capable of forming one of the causes of more immediately recognizable allergic states. The non-seasonal form has very little claim, indeed, to the definite name of hay fever. In this article we have confined ourselves to the seasonal type, although it may in passing be said that, save for the difference in the nature of the allergens concerned, many of the points raised, particularly the rhinological, apply equally well to the perennial or non-seasonal disease. Fortunately, in the pollen-produced hay fever, our search for sensitizing agents is narrowed down to reasonable limits.

Given, however, a definite seasonal occurrence, the diagnosis is not always obvious, especially among town-dwellers. Recurrent head colds and chronic sinus infections are too common to allow this. But head colds generally run a relatively definite course, starting with burning sensations in the throat or nasopharynx. The initial nasal secretion is thin and irritating to the skin with which it comes in contact. Later it becomes frankly purulent. General involvement of pharynx, larynx, and bronchi, such as occurs in a cold, rarely appears in uncomplicated hay fever. A cold continues until it has run its course, an attack of hay fever may come and go in a few hours. The secretion in hay fever is usually clear and non-irritating throughout the attack. Fever and malaise are usually absent.

In the case of chronic sinus infection the position is not quite so well defined, because, as explained later, it is probable that recurrent hay fever may ultimately lead to chronic sinus infection, but most of the difficulties may be overcome if a really careful rhinological examination is made in each case. Interpretation of the observations then made may be easier if the following points are remembered.

In hay fever the reaction to the pollen protein is shared by the conjunctival, nasal and tracheo-bronchial mucous membrane. While the predominance of the nasal symptoms has undoubtedly led to undue stressing of the importance of minor nasal abnormalities, the study of the effects of hay fever on the nose has thrown light on many chronic nasal disorders. Attacks of sneezing, frequently prolonged, accompanied by watery or mucoid discharge, headache and nasal obstruction are common to all vasomotor disturbances of the nose. They may be confused with the onset of acute infections or with local reflex irritations, but the characteristic bluish-grey pallor of the mucosa in hay fever is readily distinguished from the redness of acute infections. Moreover, the œdema does not shrink readily with cocaine and adrenaline.

Proetz has shown by radiological examination that the lining membrane of the sinuses is also affected by a transitory œdema and may swell to ten times its normal thickness, returning later to normal. Thus the headache so frequently observed during attacks of seasonal vasomotor rhinitis can be ascribed to obstruction of the ostia of the sinuses. Moreover, repeated œdema may lead to permanent hyperplasia of the lining membrane and to the production of polypi within the sinuses. Owing to the loss of ciliated epithelium and to obstruction of the ostia, sinuses so affected tend to become invaded by bacteria. The underlying allergic condition may then be masked by the secondary sinus suppuration. Local manifestations in the ears, such as tinnitus and vertigo, are occasionally present. Pharyngeal irritation is common and helps to distinguish vasomotor rhinitis from local reflex nasal disturbances in which it is absent.

Rhinological opinion is sharply divided on the question of the importance of the nasal factor in the group of diseases represented by hay fever, asthma, and chronic vasomotor rhinitis.

An increasing body of opinion favours the view that sinusitis, when present in these conditions, is purely a secondary effect of the hypersensitiveness and repeated attacks of œdema, and bears no causal relationship to it. Others regard pathological conditions of the mucous membrane and sinuses as important predisposing factors to the development of hypersensitiveness.

Certainly it is obvious that a nose already obstructed by a badly deflected septum or by the congestion of chronic infection will withstand the œdema of hay fever with more difficulty than a normal nose, and that a chronic irritation from infection may increase the local reaction and prevent successful de-sensitization.

When we come to consider the actual allergens at work in this disease, it is interesting to recall that the idea that hay was the essential cause of this condition originated early last century, and the term *hay fever* came to be used among the laity in days when the word fever was used to denote almost any indisposition. At the present time, however, it might be well, as advocated by several recent writers, to substitute the name *pollen-allergy*, for it is becoming increasingly clear that symptoms arise only in individuals particularly sensitive to contact with certain pollens, and that these do not necessarily come from grasses. The most important of the pollens are usually conveyed from the anthers of the flower to the stigma of the pistil by external agencies, particularly wind. Insect pollination has been observed in a few species of allergy-producing plants, but these all belong to those types with which, in the home, workshop or field, the patient is liable to come into very close contact. The wind-pollinated plants produce during their own particular seasons a series of pollen clouds, grains from which invade the upper respiratory tracts of all individuals in the district. Only the hypersensitive develop symptoms. In England the pollen cloud is most marked from the middle of May to the latter part of July, the season becoming a little later as we go northward.

When considering the conditions prevailing in any particular district, it must be remembered that weather has a marked influence upon the concentration of pollen in the air. Rain, for example, early in the year produces vigorous plant growth and therefore much pollen, whereas rain during the pollen season, especially slow rain and humid conditions, may effectively clear the air of pollen.

Wind affects pollen clouds in various ways. Since pollination is most marked early in the morning, wind at that time picks up much pollen. Upon the speed of the wind and its direction depend respectively the distance to which the pollen is carried and the districts mainly affected by the pollen cloud. Thus the nature of the prevailing wind directly influences the distribution of hay fever in districts with localized areas of plant growth.

The height to which the pollen may ascend varies considerably. Usually pollen is abundant at 4,000 ft.; above this level the cloud slowly loses its intensity. But it must be remembered that pollen frequently travels in the form of localized clouds, the elevation of which changes with the air currents, so that the onset of hay fever attacks may coincide with some sudden temperature or weather changes causing the clouds to descend.

The more pollen that comes into contact with the sensitive person, the more severe will the symptoms be, so that windy weather and rapid movement, such as motor travel, are specially unfavourable, and calm, settled weather generally best for hay fever patients.

Now, as to the contents of the pollen, it will be well to recall some of the more recent work upon the nature of the substances to which the patients are hypersensitive. The original conception was that the sensitizing substances in pollen must be proteins. But it has been clearly shown that pollens can be submitted to processes sufficiently disruptive to leave residues entirely free from anything giving the chemical reactions of protein, and that these residues possess undiminished power of producing reactions in the patients. Coca, Black, and others have already brought forward good evidence that the offending substances are complex carbohydrates.

From the clinical standpoint it is of more practical importance to make note of the types of pollen containing these sensitizing substances which can be found in this country. The possibly causative varieties have a very specialized distribution among the different continents, a fact which must be remembered when we are seeking to advise patients as to localities most likely to suit them, endeavouring to identify the plant which causes their trouble or employing, during cutaneous testing, pollen extracts not manufactured in this country.

In the United States of America so complete a survey of the prevailing distribution of the different types of pollen has been made that it is possible there to advise a patient with reasonable certainty as to which districts will be best for him. Unfortunately, we have no such accurate records in the British Isles, but Bray has compiled a most valuable illustrated list of all our plants and trees which give rise to sensitizing pollens together with the dates at which they liberate it.

It is a point of clinical importance, however, that with us the pollen of trees is a much less frequent cause of hay fever than that of grasses. Trees have a limited distribution and they pollinate over much shorter periods. Nevertheless, tree pollen must always be considered when we are dealing with woodland districts or heavily-treed town streets. There are extremely few British wind-pollinated weeds which can cause hay fever. Flowers, like cereals, have large sticky pollen grains, which are usually insect-carried and unable to affect any but those very closely associated with them. Strictly speaking, among the grass pollens we must include those of the cereals, but these plants produce large, heavy pollen grains which are not easily air-borne.

When investigating a case of hay fever in this country we have thus every justification for concentrating first upon the pollens of meadow grasses, unless the patient's history gives definite indications to search elsewhere. Besides making cutaneous tests with the usual pollen extracts, we may often obtain much useful information by making atmospheric pollen plates in the district where the patient lives or where he has his worst attacks. The plate consists of an ordinary microscope slide, the centre of which has been covered by a thin, even layer of glycerin. Exposed to the air, these plates collect the pollen grains falling upon them, and light staining with iodine, followed by microscopical examination, will at once show the nature and relative prevalence of the pollens with which the patient habitually comes into contact. Valuable guidance can thus be obtained in our choice of pollens when making the cutaneous tests. Details of the actual performance of these tests will not be given here, because this information is fully provided with most of the pollen extracts now on the market. It will be better at once to consider the possible methods of procedure once hyper-sensitization to any particular pollens has been proved.

Before any form of de-sensitization is attempted it is clearly most important to be certain that no chronically infected foci or remediable structural abnormalities exist in the upper respiratory tracts. This aspect of treatment is considered in our concluding paragraphs. One must also make sure that the patients are not sensitive to any allergens other than pollens with which they may frequently come into contact. Dust and animal emanations are particularly important in this respect. Failure to notice multiple sensitization is a not infrequent cause of failure in treating these cases. Consequently, although extracts of the majority of substances to which a patient is likely to be sensitive are now upon the market, it may occasionally happen that suspicion may fall upon some particular material or the dust from the patient's home, from which the laboratory can easily prepare mildly alkaline, filtered, bacteria-free extracts. In some cases of hay fever, as of asthma, it may greatly increase the efficiency of subsequent de-sensitization if, the patient's history or circumstances having given the necessary clue, substances other than pollens are included in the cutaneous tests, and if proved to cause reaction, included in the de-sensitizing mixture subsequently used.

Speaking generally, the most rational procedure for relieving the patient is specific avoidance of the offending pollen. But in hay fever this is rarely practicable, except in a very minor degree, and although it is undoubtedly true that allergen-free chambers or the elaborate methods of removing pollen from the air ventilating a patient's house, may help sufferers from pollen sensitization, yet the expense and limitation of movement involved are obvious disadvantages. De-sensitization, therefore, still appears to offer the best hope for the majority. The methods adopted differ according to whether treatment is to be given prophylactically, i.e. before the pollen season begins, or after the onset of symptoms, when the pollen cloud has appeared. The latter is certainly the most difficult and least efficacious. In 1930 Freeman published his method of " rush inoculation " for use in cases met with during the pollen season, and this appears to be a definite improvement upon earlier schemes. Extract of the specifically reacting pollens is injected subcutaneously every 1½ or 2 hours throughout a fourteen-hour day, and in this way it is found that de-sensitization may often be achieved in 2 to 4 days. The dosage must be regulated by the degree of sensitization originally noted in the patient, and is generally decidedly lower than that adopted in the prophylactic methods next to be described.

When circumstances permit, the method of choice is, however, prophylactic or pre-seasonal de-sensitization, which consists of a series of administrations of the extract, ending just before the pollen season starts. It has been claimed that a certain amount of protection may be obtained by taking pollen extracts by the mouth, and that sprays and local applications of extracts to the nasal mucous membrane will produce moderate de-sensitization, but the published records appear definitely to favour the results of inoculation by the intra- or sub-cutaneous routes.

An important question arises, however, in deciding the type of pollen extract to be used. As already explained, specific sensitization can be demonstrated with pollen when it has been so far broken down that no demonstrable protein remains. There is therefore probably little difference in potency between the various makes of extract on the market. But the question of the exact type of pollen is not so easily dismissed. With the tree pollens it appears to be essential to use extracts of the particular pollen which cutaneous tests have shown to be affecting the patient. In practice, however, tree pollen sensitization appears to be so rare in this country that prophylaxis is seldom required, especially as the tree pollen season is so short. In the British Isles we are mainly concerned with the grasses. At one time it was thought de-sensitization against Timothy grass pollen would provide protection against all the English grasses, but recent experiment appears clearly to show that, although pollens which are biologically related have a certain amount of antigenic substance common to all, yet most have varying amounts of secondary antigen peculiar to themselves. Therefore, although some protection may be obtained by using Timothy grass extract, better results may justifiably be expected if an extract is built up combining all the pollens to which the patient is sensitive.

As regards actual technique in de-sensitization that described by Bray appears to be one of the most rational and likely to give good results. Having accurately determined the patient's skin reactions towards the pollens and any other allergens with which he is likely to come in contact, the laboratory can be asked to prepare a concentrated, mixed extract in a rubber-capped bottle. From this 1 c.cm. is transferred to another similar bottle, together with 9 c.cm. of carbol-saline, thus making a 1 in 10 dilution. From this 1 c.cm. of the dilution and 9 c.cm. carbol-saline are placed in a third bottle, and so on. In this way a ment should be considered only when definite rhinological indications are present. Although the nasal effects of the hyper-sensitive state may at times require surgical treatment, care should be taken (*a*) to distinguish them from primary nasal disease, and (*b*) to see that whatever local measures are required, de-sensitization treatment is also attempted. With these safeguards the rhinologist's aim should be to obtain an efficient airway in a nose free from chronic bacterial infection.

Reference

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Indigestion

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THOUGH most of us know what we mean by indigestion, it is not easy to define it. It really connotes want of digestion or incapability of digesting food, but it is used generally in a more limited sense to mean difficulty in digesting food. The word dyspepsia is often employed, especially when gastric digestion is interfered with. It is included in this paper, which will attempt to discuss the management of patients complaining of discomfort (arising in the digestive organs) associated with the process of digestion.

Normally we are unconscious of the phenomena of digestion, except for the rather pleasant sensations of eating with appetite, of comfort after a meal and the call for defæcation. It is only in morbid conditions that the digestive functions obtrude themselves into consciousness in adult life. In the young infant it seems to be otherwise; stimuli from the internal organs appear to dominate those from outside and the processes of digestion even in the healthy baby seem to be accompanied by sensations which readily become painful (" wind "). With the development of the child these internal sensations rise less and less into consciousness, and the healthy adult ignores wind of an ordinary amount. The digestive organs are insensitive to heat, cold and light touch; but pressure from contact may excite painful sensations in the presence of inflammation of subjacent organs; for example, pain and tenderness are present when the peritoneum is involved in the " acute abdomen." Sensations from the hollow viscera are associated with changes in the tension of the muscular layer of the wall of the viscus, either from spasm or distension. Most people have felt the griping pain of abdominal colic, following indiscretions in diet, such as those due to over-ripe or unripe fruit or contaminated food. A gastric ulcer or a jejunal ulcer following gastro-enterostomy may cause pain after the simplest food, and the patient may, therefore, reduce his diet to one meal a day, in the evening, in order to go to bed and rest during the succeeding hours of indigestion. But in addition to food and the state of the digestive organs, the sensitivity of the individual is another important factor. This varies greatly in individuals; in many patients with chronic indigestion there appears to be a lowered threshold to pain or a reaction to subnormal stimuli. The recurrence of discomfort produces a greater susceptibility, which is increased by the habitual introspection so frequent in the subjects of functional dyspepsia.

When complaining of indigestion a patient usually means *discomfort during the digestive process.* As a careful history will often lead to a correct diagnosis, the patient should be allowed to tell his own story, and then a little cross-examining will elicit the onset of the symptoms in regard to their duration and character, the course which the complaint has followed, the severity and the constant or intermittent character of the discomfort, and especially the time relation to food. Additional information of value is whether the discomfort is accompanied or relieved by vomiting, whether blood has ever been vomited or passed as melæna, and whether the patient has lost weight. The patient should then be questioned about his habits in regard to hours of meals, type of foods taken, the time spent over meals, the action of the bowels, the use of aperients, of tobacco and alcohol, amount of exercise and of sleep, occupation, domestic or business worries. Careful examination should then be made of the teeth, tongue, throat and abdomen, as well as the condition of the heart, lungs and nervous system. By this means a diagnosis can often be made, but in many cases special supplementary tests must be made by chemical tests of the vomit, gastric contents after test-meal and of the fæces, and an X-ray examination of the alimentary tract after a barium meal and barium enema. Since the interpretation of internal stimuli on the part of the patient is often defective, the physician must weigh all the evidence, and can then make a diagnosis often by a process of exclusion.

CHRONIC INDIGESTION

Indigestion may follow faulty habits, organic disease of the digestive tract or functional derangements of its secretory or motor mechanisms. Perhaps the commonest cause in everyday life of discomfort after meals is the bad habit of hurrying over meals, chewing the food incompletely or swallowing large boluses. Gulps of air are swallowed with hurriedly taken food and drink, and give rise to distension and flatulence. The practice of taking solid food and fluids separately is a simple but often successful means of prevention. The teeth should be examined, and those found to be painful or infected removed and adequate dentures supplied. Pus swallowed from infected teeth and gums, tonsils and accessory nasal sinuses will readily set up an atonic gastritis leading to indigestion. Alcoholic gastritis, frequent in all classes, may be diagnosed readily when kept in mind. The nature of the dyspeptic troubles, anorexia and distaste for food, morning vomiting of thick mucus; other signs of chronic alcoholism—tremor of hands, abnormal excitability, restlessness, slight loss of self-respect and of care of clothes—should lead to inquiry into the patient's habits. A common cause of indigestion nowadays is the recourse to aspirin and other coal-tar drugs for headaches, muscular pains and fatigue. Attention to the causes in these conditions leads to improvement.

Discomfort two to three hours after a meal, relieved by taking food, usually temporarily suspended by taking alkalies, and accompanied by heartburn, acid eructations and salivation in gushes occurs in the *pyloric syndrome.* These patients are usually constipated and their symptoms worse when constipation increases. The discomfort may come in attacks during cold weather, after worry or exposure. It may be due to *hyperchlorhydria,* and is then often intermittent; if more regular after most meals and in the night, it is more likely to be *duodenal* or *pyloric ulcer, duodenal diverticulum, cholelithiasis,* or *chronic appendicitis.* In the last the attacks may be accompanied by localized tenderness and rigidity in the right iliac fossa, the stomach being upset secondarily, but sometimes they are not.

In the severe cases of this group it may be necessary to put the patient to bed on a diet of egg and milk. Gradually, boiled or steamed fish, minced chicken, thin crisp toast and butter may be added, until a diet is taken which is suitable for the less severe cases. This should consist of simple foods, but sweets, fruit and greens should be taken in small quantities only. Meat soups, savouries and highly-spiced foods are inadvisable. Cream, ham and fatty foods may be eaten freely, as may meat, fish, eggs, rice, macaroni or vermicelli, milk and suet puddings, milk and cream soups made from vegetable stock. Fluids should not be drunk during the meal, but a fair amount taken at the end of the meal, and may usefully contain a teaspoonful of one of the alkaline powders consisting of bismuth, citrate or bicarbonate of sodium, magnesium oxide, or calcium carbonate in equal quantities.

The following is an example of a typical day's diet :—

Breakfast : Well-boiled porridge and cream, or cereal breakfast food; egg, fish or cold ham; crisp toast and butter; marmalade jelly.

A switched egg during the morning.

Lunch or *mid-day dinner :* Meat, chicken or game, simply cooked; mashed potato; macaroni, rice or vermicelli; milk pudding, custard, steamed pudding, baked apple, prune purée or jelly; toast; butter;

water at the end of the meal.

Tea: Bread or biscuit and butter; spongecake; weak tea and cream.

Dinner: As at lunch with addition of vegetable or milk soup, boiled or steamed fish with plain sauce.

Or *supper:* Fish, cold meat or an egg, with toast and butter, followed by milk pudding.

Two tablespoonfuls of olive oil may be taken half an hour before lunch and dinner. Alcohol and tobacco are not advisable. Of medicines alkalines are best and may be given after meals, or in some cases before meals when given as aluminium hydroxide (neutralon, alocol). Belladonna is often useful. For the attacks bicarbonate of sodium or magnesium carbonate may be given; the cremor magnesiæ (B.P.C.) is useful for the accompanying constipation as well. Gastric lavage will relieve an attack of hyperchlorhydria.

Discomfort on taking food, which passes off when the stomach is empty or is relieved by vomiting, occurs in conditions of subacidity, *chronic gastritis*, *cancer*, *anæmia*, and *after exhausting diseases*. The appetite is poor and the patient quickly feels full; digestion is delayed and diarrhœa may be troublesome. The indications are: to rest, especially to lie down for an hour before meals; the food should be easily digested, simple, nourishing and nicely served, avoiding rich sauces, hot fats, twice-cooked meats and foods containing hard pieces. It may be necessary to start with albumen water, whey or barley water, which may be flavoured with orange juice and contain added glucose, or with partly-peptonized foods and the various milk foods, in small quantities every three hours during the day and in wakeful intervals at night. In the absence of organic disease of the stomach gastric lavage often gives a good start. A mixture containing 5 drops of tincture of nux vomica, 10 drops of dilute hydrochloric acid, 30 drops of glycerin with compound infusion of gentian to an ounce, may be used before meals, and 40 to 60 minims of dilute hydrochloric acid in a tumbler of diluted fruit juice may be sipped with the meal when a more solid diet is introduced.

A diet for a case of chronic gastritis may be chosen from the following :—

Breakfast : Porridge, force, post toasties or puffed rice with cream ; fresh fish (steamed or boiled), cold ham or eggs, varied ; white toast ; butter ; marmalade jelly or honey ; tea with milk or cream, or weak coffee and milk.

11 *a.m. :* Glass of milk, plain or citrated, Horlick's malted milk or cup of Benger's or Allenbury's food with biscuits or rusks.

Lunch or *mid-day dinner :* Minced beef without flavouring (except a little salt), tender fillet of beef, roast or boiled mutton or lamb, grilled or steamed chop, sweetbreads, calf's or sheep's head, brains, tripe, braised tongue, young rabbit or chicken, boiled or roast, as cream, or soufflé ; potato—creamed or plain mashed ; sieved green vegetables or whole cauliflower, young French beans, asparagus or a little sieved broad beans ; milk, light steamed or bread-and-butter pudding, custard or junket ; sieved fruit or baked apple ; white toast ; butter ; cream.

Tea : White bread and butter ; plain cake ; biscuits or tea rusks ; jelly or honey ; tea with milk or cream.

Dinner : No soup ; fish, boiled, steamed, scalloped or as cream or soufflé ; meat as at lunch ; potato and vegetables as at lunch ; milk pudding, custard, junket, jelly, blancmange, caramel, vanilla, lemon, orange, prune, peach, apricot flavouring ; rice, tapioca or sago cream ; sieved fruit or baked apple ; white toast ; butter ; cream.

Or *supper :* If tea be later and more solid, a light supper as on page 61, instead of dinner.

10 *p.m. :* Milk, Horlick's malted milk, Benger's or Allenbury's food, with biscuits or rusks.

In cases of atonic dyspepsia without gastritis, and to tempt the appetite, sauces, relishes, and flavourings may be added to the various dishes. Alcohol is not usually advised. If prescribed, as in some atonic or in elderly patients, a sound light wine or well-diluted whisky is taken with lunch and dinner. Gentle exercise in the open air should be taken each day, short of fatigue. A change from home surroundings will often stimulate convalescence from influenza.

Similar discomfort may follow motor insufficiency of the stomach. Of this there are various grades depending on *atony of the stomach wall* or on *stenosis of the pylorus* from spasm, hypertrophy of the sphincteric muscle, scarring of a pyloric ulcer or pyloric carcinoma. With dilatation of the stomach following pyloric stenosis the patient may be comfortable while the stomach is empty; gradually, as a balance of the food taken remains, distension and discomfort come on, to be relieved after a day or two by copious vomiting. With pyloric growth or infected gastric contents the vomit may be very offensive. In simple cases a dry diet with small frequent meals and fluids apart from meals, and gastric lavage to clean out the stomach of indigestible residues and debris will often be found successful. Various antiseptics are recommended; of these, sulphocarbolate of sodium, creosote and β-naphthol are useful. Strychnine may be given by mouth or subcutaneously, and faradism to the abdominal wall may help. In severe cases of pyloric narrowing from organic disease operation may prove necessary.

Discomfort which is like a weight or lump in the epigastrium, often accompanied by flatulence, occurs in *cholecystitis* and *gall-stones.* It may go through to the shoulder blades at the back. The discomfort tends to come in attacks, when it is increased by taking food; there is often a feeling of chilliness of the skin and " gooseflesh " in the attacks. Actual colic may occur and jaundice of some degree. Eggs and fat, because they contain cholesterol, a constituent of gall-stones, are often eliminated from the diet in gall-bladder disease. On the other hand, yolk of egg and fats stimulate contraction of the gall-bladder, and on this ground they may be allowed, in small amounts. Since most of these patients are overweight, a reduction diet is indicated, consisting of fish, meat, green vegetables and fruit, with small quantities of bread, scones, butter and cream. Pastry and rich dishes are better avoided. Salines containing magnesium, such as Epsom and Vichy salts, are useful, and hexamine, even in large doses when combined with alkali, as a gall-bladder antiseptic. Exercise in the open air should be encouraged.

Attacks of discomfort after worry, anxiety, hurried or irregular meals, rich fatty foods, fatigue and chill, with griping pain across the upper abdomen followed by loose motions, are due to *colitis.* Mucus may be passed in the stools in jelly, shreds or membranes. These patients do better by avoiding fatty foods, sausage, fried and made-up dishes. Powdered kaolin, sometimes combined with bismuth or charcoal, is useful, and the bowel may be calmed with castor oil, better taken as the following emulsion :—

℞ Olei ricini	ʒi
Mucil. acac.	ʒi
Sod. bicarb.	grs. x
Syrup	ʒi
Aq. cinnam. ad	℥i

Sig. : One to three times a day.

Discomfort, with irregularity of the bowels, occurs also in *diverticulitis* of the colon. The pain is situated usually in the left iliac fossa, where the inflamed and tender descending colon and sigmoid may be palpable. The diet should not contain any indigestible and hard residues; liquid paraffin should be given by the mouth and by rectal injection, and gentle intestinal douches with normal saline solution are useful.

Nervous dyspepsia (functional) occurs in many forms. Patients may have all the subjective sensations and most of the anomalies of secretion found in organic disease. Functional disorders do not run a definite course, but vary from time to time. As a rule the digestive symptoms are independent of the amount and form of food taken, the discomfort is more vague and diffuse than in organic disease, and the patient's nutrition is less liable to be upset. Diagnosis is made still more difficult when the patient with organic disease has in addition an obvious psychopathic tendency. Such cases call for the fullest investigation, for the inclination is to emphasize the neurasthenic aspect and diagnose a neurosis. Many cases of gastric and duodenal ulcer have been labelled neurotic. Full clinical, chemical and X-ray examinations should be carried out before a diagnosis of nervous dyspepsia is made. A careful history, giving the patient time to talk himself out, saves time in the long run. Even when functional indigestion is diagnosed, it is a good thing to treat the patient more seriously than less, to start on a lower plane of diet and effort than seems to be required, and to build up gradually. Thus the patient is able to develop an immunity to his discomfort and eradicate his phobia. The personal influence of the physician in inspiring confidence is important, and isolation from home and friends and a rest-cure in a nursing home are often advisable. As well as attention to diet, exercise and habits, the general neurotic state of the patient must be kept in view, and treatment adopted to improve the general health. Massage, hydrotherapy, golf, riding, and psychotherapy are valuable. Of the medicines, bromides, luminal, arsenic and iron are most suitable. When progress is well established the patient should be encouraged to follow a carefully laid down plan with full instructions as to diet, rests, sleep and exercise for a convalescent period before returning to the duties of ordinary life. This gives a measure of confidence which will stand him in good stead when he returns to work.

ACUTE INDIGESTION

Two forms of acute indigestion occur. *Acute gastritis* of toxic origin from unsuitable or contaminated food, in which the patient has epigastric pain and tenderness, vomiting of the irritant material followed by scanty vomit of alkaline mucus which may be blood-stained from much retching, is treated by evacuating the stomach by lavage or taking quantities of weak sodium bicarbonate lotion, and fasting, followed by albumin water, barley water and jelly. Bismuth, with a little tincture of opium added if necessary, is a useful drug. In a day or two light solids may be given and gradually a normal diet resumed in most cases. *Attacks of hypersecretion* ("*bilious attacks*") follow some indiscretion in diet or irregularity of meals, worry or bad temper. The patient has epigastric discomfort, flatulence, often with air-swallowing and noisy eructation, and vomits copiously a strongly acid material which, later, contains bile. Rest in bed, gastric lavage and alkalis are prescribed, and an enema if the bowels are constipated. Small doses of calomel followed by a saline will often calm the stomach and counteract constipation. Recurrent attacks should lead to inquiry into the patient's habits of food and work; examination may reveal gall-bladder or appendicular disease.

REFERRED INDIGESTION

The patient may complain of indigestion when the disorder arises in other systems than the digestive tract. To treat the symptom then will lead to no lasting benefit, and the underlying cause must be sought out and dealt with. There is hardly a single organ of the body, disease of which may not have repercussions on the digestion. Patients with heart disease, for instance, may refer their symptoms to indigestion. In these cases carminatives may be helpful, but the circulatory defect must be given appropriate treatment. *Cardiac pain,* especially of the form of angina minor, is commonly referred by the patient to indigestion; it may be misleading to the practitioner, too, since the discomfort is in the precordial region or epigastrium, is accompanied by flatulence, and recurs intermittently following exercise or effort especially after a meal. Examination of the blood-pressure and heart, and careful inquiry as to the causes of the attacks will help the diagnosis. One of the most constant features of angina is its association with bodily stress or fatigue, or with emotion. Gastric troubles are more closely associated with taking food. In angina too the pain tends to radiate into the left arm. Patients with this complaint must have their exercise limited; rests after meals, even complete rest in bed for a time, may be indicated. The diet should be non-flatulent, with reduced starches, and fluids are often better taken after or apart from meals. Vaso-dilators are helpful if the blood-pressure is raised, such as iodides, trinitrin, or erythrol tetranitrate. Flatulence may be relieved by a few drops of oil of peppermint or cajuput on a lump of sugar, or by a teaspoonful of charcoal. A possible syphilitic basis should be looked for and treated if necessary. Patients with *congestive heart failure* often have indigestion, from liver engorgement and gastritis, and should be treated by rest in bed; five small meals of simple and attractive foods should be given, and fluids taken between meals. It is often very difficult to induce a patient to take a salt-free diet, and all the ingenuity of the nurse or dietitian will be needed to provide dishes that appeal to the patient. With improvement in the circulation the digestive symptoms become less troublesome, but often digitalis preparations by the mouth seem to upset the stomach; they may be tried in pill form, as Nativelle's granules, or by subcutaneous injection of digitalin or strophanthin.

Early tuberculosis of the lungs or other parts of the body often causes dyspepsia, with lack of appetite and loss of weight. Observation of the morning and evening temperature, careful examination with the stethoscope and radiographic screen aid diagnosis. In this type of case, as with indigestion accompanying inanition from a cancerous growth outside the alimentary tract, anæmia and recovery from exhausting diseases, such as the influenza which was prevalent last winter, the indications for dieting are to give small frequent meals of readily digested and appetizing foods. The patient should avoid fatigue, resting in bed the whole time, or at least for the hour before the principal meals. Fresh air and a sunny room, with bright flowers and a cheerful nurse, are requisite. The poor appetite and feeling of fullness as soon as a meal is begun, may be helped by the acid gentian mixture taken half an hour before meals. In regard to the gastric crises of *tabes* and the digestive disturbances of *early pregnancy*, described by the patient as indigestion, it is only necessary to remember these conditions during the investigation of the case, and to seek for confirmatory or negative evidence. Similarly, *organic disease of the nervous system*, such as that from arteriosclerosis in the elderly or from cerebral tumour, may produce digestive disturbances that are puzzling until the cause is found. Early *uræmia* in chronic nephritis is common and may be confusing, but examination of the urine and of the blood-urea will differentiate this type of patient. Attention to the action of the skin, avoiding cold and damp; a simple diet whose main constituents are bread, milk, fish, white meats, vegetables and fruits, avoiding alcohol and excessive meat, with moderate exercise, avoiding fatigue, will be required. In *cirrhosis of the liver* there is, in addition to the accumulation of the waste products in the blood, congestion of the gastric mucous membrane; and so it more properly comes under the heading of true indigestion or deranged digestion due to causes in the alimentary tract itself.

CAUSATION

Though no key can be offered to a simple classification of indigestion and the diagnosis must be made by a process of exclusion, some help may be gained from an attempt to classify the causes. By being aware of the possibilities the practitioner may be led to a right conclusion. The following include the common causes of indigestion :—

Faulty habit : Incomplete mastication; hurried meals;

air-swallowing.

Toxic: (*a*) *Internal,* infection of teeth, tonsils or nasal accessory sinuses; nephritis; tuberculosis or malignant disease; fevers or exhausting illness. (*b*) *External,* rich or contaminated food; aspirin; alcohol; tobacco.

Congestive: Heart disease; cirrhosis of liver.

Organic: Gastritis; peptic ulcer; duodenal diverticula; cholecystitis; gall-stones; chronic appendicitis; colitis; diverticulitis of colon; cancer of alimentary tract.

Emotional (functional dyspepsia): Worry; overwork; domestic unhappiness.

SUMMARY

A patient who complains of indigestion should be listened to with patience. It is a good thing in some cases to ask him to write out an account of his symptoms, their mode of onset and times of occurrence. His habits should be inquired into. A full clinical examination should then be made. In this way a tentative diagnosis may be made and a line of treatment laid down. If, after a short but sufficient trial of treatment, adequate progress is not reported, the special chemical tests of gastric secretion and fæces and a full alimentary X-ray examination should be carried out with no undue delay. Thus the diagnosis will be made clear. Even the negative results of such a complete investigation will be an assurance to the practitioner and a satisfaction to the patient in conditions such as functional dyspepsia. In cases of simple indigestion, when the cause has been established, the practitioner should prescribe an appropriate regime and encourage the patient to follow it carefully, "as men who have long felt themselves weakened by indisposition, give themselves up at last to the mercy of medicine and submit to certain rules of living, which they are for the future never to transgress."

Constipation and Mechanical Laxatives

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THE increasing employment of bland physiologically-acting substances in the treatment of chronic constipation, to the exclusion of mineral and vegetable drugs which produce their effect by increasing the force and rapidity of the normal peristaltic movements, has constituted one of the most radical changes in therapeutics during recent years. This is due to the fact that the action of these substances which may be conveniently termed " mechanical " laxatives, accentuates the normal physiological processes concerned in the propulsion of the intestinal contents through the alimentary canal and does not involve irritation or direct stimulation of the intestinal wall—effects which accompany the employment of certain mineral and vegetable drugs and which, too frequently, lead to the formation of habit. A number of mechanical laxatives are at the disposal of the prescriber and, as they vary considerably in their pharmacological properties, it is the purpose of the present communication to survey, from the experimental standpoint, those most commonly employed.

Mechanical laxatives may be divided into two groups :—(1) Those which act by softening the intestinal contents, thereby facilitating the propulsion of fæcal matter through the intestine. With this group there is not any increase in the bulk of the intestinal contents and, therefore, no peristaltic reflex is invoked. Examples are : (*a*) liquid paraffin and other unsaponifiable hydrocarbon oils,[*] and (*b*) olive oil, which must be administered in sufficient quantities to allow of some free oil reaching the large intestine after it has been subjected to the action of the digestive juices.

(2) Certain hygroscopic substances which are administered in comparatively small volume and which, during their passage through the intestinal tract, absorb water and expand considerably. As a consequence, the bulk of the intestinal contents is greatly increased, and this stimulates the production of a peristaltic reflex. Examples of this group are psyllium seeds, agar-agar and bassorin, but the hygroscopic power of psyllium is so slight that it is difficult to believe that this property is solely responsible for the effects observed.

LIQUID PARAFFIN

Of substances which may be termed mechanical laxatives, liquid paraffin is the most important because it is, perhaps, the most commonly prescribed physical laxative, and also because the public consumes large quantities and often continues its daily use for years. It is interesting to remember that liquid paraffin was originally introduced into therapeutics as a substitute for cod-liver oil in the mistaken belief that it could be absorbed from the intestine and utilized as fat. The use of this oil as a remedy for chronic intestinal stasis was first suggested by Randolph in 1885,[12] but the writings of Lane, Hurst, Neville Wood, and others emphasized its value in the treatment of all types of chronic constipation and were largely responsible for popularizing its employment in this connection. It is particularly successful when constipation is characterized by hard fæcal masses and when, as in the case of hæmorrhoids, it is desired to produce a well-lubricated motion. As the oil is without irritant action upon epithelial surfaces, including the intestine, it may be administered to infants and to those for whom for various reasons stronger laxatives are contra-indicated.

It is commonly stated that liquid paraffin is an ideal laxative because it is an unsaponifiable hydrocarbon oil which is indigestible and incapable of absorption. Recent observations, however, by Channon and Collinson,[3] indicate that liquid paraffin is absorbed from the intestine and is deposited in the liver. Post-mortem examinations of the livers of rats which had been fed for five weeks upon a diet containing 5 per cent. of liquid paraffin, and also of the liver of a pig which had been given 100 c.cm. of the oil daily for 54 days, enabled them to conclude that, so far as these animals were concerned, liquid paraffin was absorbed from the intestine and was deposited in the liver in appreciable amounts. The total quantity absorbed must be small, for both Bradley and Gasser,[2] and Hutchison[6] were able to state that, except for doubtful traces, mineral oils were not absorbed by the intestine; and J. Mellanby,[10] during six hours' observation, was unable to detect absorption of liquid paraffin into the lymphatic system of the intestine. The importance of Channon and Collinson's observation, therefore, lies, not so much in the fact that liquid paraffin is absorbed from the intestine as in the possible effects which may result from its deposition in the liver.

Although liquid paraffin has been used for so long and so extensively in the treatment of constipation, there is still a lack of unanimity regarding its effects upon the digestion of food and upon absorption of the products of digestion. Mellanby[10] found that the oil inhibited absorption of bile from the intestine and, therefore, both the secretion of pancreatic juice and the futher secretion of bile were diminished. In consequence of this observation he concluded that both digestion and absorption were retarded. Green[4] states that paraffin, being an indigestible insoluble hydrocarbon, must cause a thin film covèring the absorptive mucous surfaces of the intestine, thereby interfering directly with the digestion and absorption of foodstuffs; also it would similarly surround particles of food and interfere with the mechanical approach to them of the digestive juices. He quotes no experimental or clinical evidence in support of this opinion. On the other hand, Olsen[11] reports a series of experiments which he carried out upon dogs, the results of which are not in harmony with the above opinions. He found that the digestion and absorption of protein, as judged by the fæcal nitrogen-content, were not influenced by the oral administration of liquid paraffin, and he confirmed this result by observation upon a series of patients. He found, in addition, that paraffin had no effect upon the absorption of carbohydrates because the amount of reducing substance in the fæces remain unchanged after the oil had been added to the diet, and he, therefore, concluded that liquid paraffin, when taken by the mouth in therapeutic doses, had no influence upon the digestion and absorption of either protein or carbohydrate.

It is a simple matter to show that liquid paraffin will retard peptic digestion *in vitro.* If small pieces of fibrin, coloured with carmine, are placed in 5 c.cm. of a 0·5 per cent. solution of pepsin, together with 5 c.cm. of 0·4 per cent. hydrochloric acid, and incubated at 37° C., the fibrin is digested and the carmine liberated. At the same time, the dye colours the solution in the proportion to which digestion has occurred, and in one hour this assumes a deep red colour. When 1 c.cm. of liquid paraffin is added to such a mixture, digestion is markedly delayed, in four hours there is no apparent change, and in twelve hours the solution is only slightly tinged with carmine. Observation shows that the fragments of fibrin do not come directly into contact with the solution because they are coated with oil, and therefore they cannot be digested.

It does not necessarily follow that liquid paraffin retards peptic digestion *in vivo,* because there is no delay in digestion if, in the above experiment, the liquid paraffin is emulsified before being added to the pepsin mixture. The emulsified oil is evenly distributed throughout the solution in the form of small globules and no protective film is formed on the surface of the fibrin. This indicates that, in practice, the effect of liquid paraffin upon peptic digestion can be modified either by administering the oil in an emulsified form or by administering foods rich in emulsifying agents, such as milk and eggs, immediately after the requisite dose.

The action of liquid paraffin upon tryptic digestion resembles the action upon peptic digestion; it prevents effectually access of the digesting fluid to egg-white, but this can be prevented if the paraffin is first emulsified. With lipase there is no effect; it does not inhibit, even in the slightest degree, the action of this ferment upon olive oil.

The conclusion to be drawn from the above experiments is that paraffin is capable of inhibiting the digestive action of the proteolytic ferments, but that this action is modified when the oil is emulsified. If liquid paraffin is advised as a laxative, there can be no doubt that it is better to prescribe it in an already emulsified form because the natural emulsifying power of the patient must vary to a considerable extent. Patients who complain of " seepage " or leakage of oil from the rectum whilst taking a small or moderate dose, are evidently incapable of providing the natural emulsifying agents, and this defect is also probably responsible for the loss of weight and digestive disturbances observed occasionally in those taking liquid paraffin.[13]

The effect of liquid paraffin upon absorption from the small intestine.—It has been suggested[4] that paraffin forms a thin film covering the absorptive mucous surface of the intestine, thereby interfering with the absorption of foodstuffs. The following experiment, however, indicates that this oil has no effect upon the absorption of glucose from the small intestine :—

A cat was anæsthetized with urethane and four ligatures were tied round the small intestine in its distal part to form three isolated portions of gut each six inches long. 2 c.cm. of liquid paraffin were injected into the first loop through a fine needle and 1 c.cm. into the second loop, while the third loop was untouched. After half an hour—in order to allow the oil to spread over the mucosa—2 c.cm. of a 10 per cent. aqueous solution of glucose = 0·2 gm. of glucose were injected into each of the three loops. After an hour the contents of each portion were carefully examined quantitatively for glucose and the amount remaining in each case was identical, namely, 0·08 gm.

The conclusion to be drawn from this experiment is that liquid paraffin exercises no influence over the absorption of glucose from the small intestine of the cat, and there is no reason to doubt this statement in the case of man.

The fæces of patients taking liquid paraffin are usually soft, and they possess a greasy appearance, undoubtedly due to the presence of the oil. Under the microscope globules of oil which vary considerably in size can be seen, and careful search leads, not infrequently, to the discovery of globules containing striated muscle fibres. The presence of these striations denotes that the fibre has not been subjected adequately to the action of the digestive juices, evidently on account of the protective film of oil, and this fact supports the opinion expressed above, that liquid paraffin exercises a definite effect upon digestion.

EMULSIONS

In view of the experiments quoted above, which indicate that the effect of liquid paraffin upon digestion is dependent upon the degree of emulsification to which it is subjected, it is of interest to examine the composition and properties of those emulsions of liquid paraffin which are already in common use. A typical formula for such an emulsion[9] is :—

Agar - - - - - - - -	0·7 per cent.
Gum acacia - - - - - - -	2·1 ,,
Tragacanth - - - - - - -	0·3 ,,
Sodium benzoate - - - - - -	0·2 ,,
Flavouring - - - - - - -	0·7 ,,
Liquid paraffin - - - - - -	50 ,,
Water - - - - - - - -	48 ,,

But this composition is capable of considerable variation, and not infrequently other substances, for example, phenolphthalein and magnesia, are incorporated in order to enhance the laxative effect.

It will be observed that the above emulsion contains only 50 per cent. of oil; 48 per cent. is represented by water, whilst the remainder consists of emulsifying agents, flavouring, preservatives, and a small quantity (0·7 per cent.) of agar. This amount of agar is very small and is insufficient to produce any laxative action; 1 oz. of the above emulsion contains under 5 grains of agar, a very small dose when compared with the B.P.C. dose of 60–120 grains, and the U.S.P. dose of 2½ drachms. Accordingly, any effect possessed by this emulsion in relieving constipation must be in respect of its liquid paraffin content.

The formulæ of certain branded emulsions express the agar content in terms of agar jelly, thereby indicating that this substance has already absorbed the maximum amount of water before it is incorporated in the emulsion. In such circumstances, agar can possess no further hygroscopic action and, if we except the slight lubricant effect of agar jelly, the laxative action must again be due entirely to the liquid paraffin content.

When liquid paraffin is administered in the form of an emulsion its taste and natural " oiliness " are effectually disguised, but it must be remembered that, in order to secure the same therapeutic effect, the dose of emulsion must be double that of its main constituent, and this adds considerably to the cost of the preparation.

Experiments indicate that neither peptic nor tryptic digestion is retarded when an emulsion is added to artificial digestion mixtures under appropriate conditions, and, furthermore, emulsions of liquid paraffin have no effect upon the absorption of glucose from the small intestine of the cat.

Paraffin-agar emulsions may therefore be regarded as superior to liquid paraffin alone, because they do not retard processes concerned in the digestion and absorption of foodstuffs. They can be flavoured and, in addition, they serve as suitable vehicles for the administration of adjuvant drugs.

AGAR

The employment of agar as a laxative was first suggested by A. Schmidt in 1905[16] on account of its property of absorbing water and of swelling in the intestine, thus initiating a peristaltic reflex. At the present time it is seldom prescribed to be taken alone, but it is, not infrequently, administered either as a constituent of paraffin emulsions or as an excipient in some aperient pills. In both instances the amount of agar taken is so small that it is difficult to credit it with any laxative action.

When agar is to be administered alone, it should be prescribed in the form of the chopped substance, for it is believed that powdered agar produces intestinal irritation, an effect which is inadmissible when a purely physiological action is desired. It must be taken in comparatively large quantities : 2 tablespoonfuls of the chopped substance representing, approximately, the usual dose of 10 gm. (2½ drachms).

The hygroscopic power of agar *in vitro* can be investigated in two different ways. A simple and effective method is to place 1 gm. (= 5·5 c.cm.) of the chopped material in a known quantity of distilled water for a given time, and subsequently to filter off and measure the amount of unabsorbed water. It will be found that agar absorbs 13 c.cm. of distilled water in 24 hours. Klecker recently described[7] a graphic method of recording the amount of water absorbed by swelling substances, and this can be applied to agar. Briefly, the method consists in placing a known quantity of the substance to be investigated beneath a perforated aluminium piston, working in a dry, tall, vertical glass cylinder. The piston rests upon the material to be tested, which, in turn, occupies the bottom of the cylinder; this can be filled with water or other fluids. After passing through the perforations in the piston, the fluid comes into contact with the material; the resulting expansion raises the piston, the movements of which can be recorded upon a slowly revolving drum.

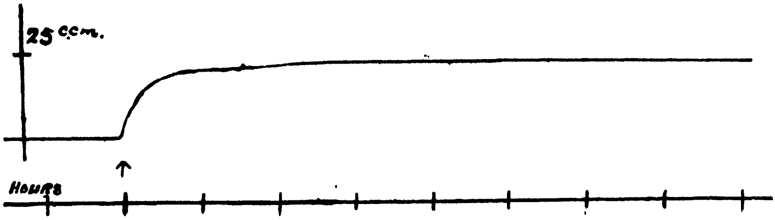

FIG. 1.—Expansion of agar. Distilled water added to 10 c.cm. of chopped agar (weighing 1·8 gm.) at the point indicated by the arrow.

By this method Klecker found that 10 c.cm. of chopped agar weighing 1·65 gm. expanded to 60 c.cm. when placed in contact with distilled water. Repeating this experiment, I was unable to obtain an expansion of more than 22 c.cm. from the same volume of agar, weighing 1·8 gm., in 6 hours. This indicates that the amount of water absorbed was 12 c.cm., and, while the cause of the discrepancy with Klecker's figures is not apparent, the result is comparable with that obtained by the method previously described. From these figures, it will be appreciated that one tablespoonful of agar (= 14 c.cm. = 2·5 gm. approx.) is capable of expanding to 34·0 c.cm., and this gives some indication of the bulk available in the fæces for instituting a peristaltic reflex.

Digestion.—It is stated by Saiki[14] that, in man, 10 to 20 per cent. of agar ingested is digested and absorbed, while Lohrisch[8] states that herbivora can utilize 50 per cent. If agar is digested and absorbed in the intestine, a proportionately less amount is available for the purpose of which it was administered. I have not been able to demonstrate any delay in either peptic or pancreatic digestion; repetition of experiments described previously indicates that agar does not delay either of these functions *in vitro.*

Agar can be detected readily in the fæces, and the swollen gelatinous granules can be seen with the naked eye. Microscopical examination does not prove that these contain ingested particles of food, and the available evidence indicates that agar is entirely without effect upon the digestive functions. It is probable that agar expands to the same degree in all parts of the alimentary tract. Klecker found that there was little variation in the final volume when agar was placed in contact with distilled water, tap water, acidulated pepsin solution and an alkaline solution.

BASSORIN

Bassorin is a hygroscopic substance which has recently been introduced into therapeutics as a laxative. It is a vegetable mucilage, insoluble in water, being the dried juice of a tree of the astragalus species (*stercualiacia*), which is indigenous to Africa, Persia, Syria and Kurdistan, and it is commonly seen in the form of white amorphous flakes or granules, known commercially as "normacol." Bulk for bulk, bassorin is much heavier than agar, and, although there is a slight variation in different samples, it can be ascertained that the average weight of 10 c.cm. of bassorin is 7·4 gm., whilst the weight of the same volume of chopped agar is only 1·8 gm. Experiments indicate that bassorin has a much greater capacity

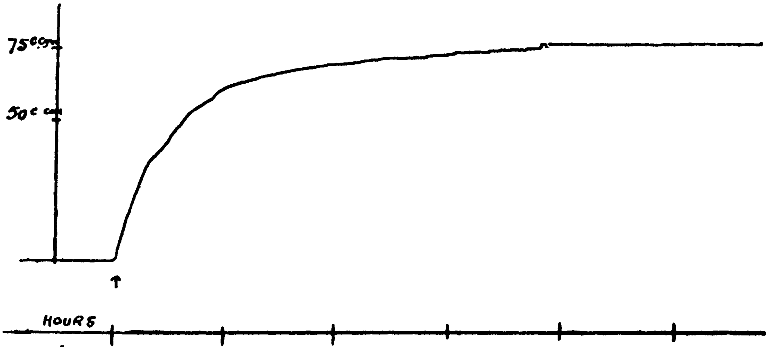

FIG. 2.—Expansion of bassorin. Distilled water added to 5 c.cm. of bassorin (weighing 3·7 gm.) at the point indicated by the arrow.

than agar for absorbing water, and its efficiency, therefore, is correspondingly increased. If 1 gram (= 1·35 c.cm.) of bassorin is placed in a known quantity of distilled water, and if, after 24 hours, the unabsorbed water is filtered off, it will be found that 28 c.cm. have been absorbed. Under the same conditions agar will only absorb 13 c.cm. Using the method already described, Klecker found that 5 c.cm. of bassorin, weighing 3·7 gm., expanded to 220 c.cm. when placed in contact with distilled water, but upon repeating this experiment, I was unable to obtain a similar result; the maximum recorded being 80 c.cm. from 5 c.cm. of bassorin weighing 3·8 gm.

Digestion.—Bassorin has not any effect upon peptic digestion. When it is added to an acidulated solution of pepsin there is no delay in the digestion of carmine-fibrin. It has no effect upon tryptic digestion, and it does not delay the absorption of glucose from the small intestine of the cat.

The fæces.—I have examined the fæces of patients under the care of Dr. G. S. Haynes taking bassorin for the relief of constipation, and in each instance the stool has been soft. It is usually shaped, but, in some instances, it is definitely loose. The softness is undoubtedly due to an increase in the moisture content, for Berg[1] has shown that the administration of 25 gm. of bassorin causes an increase of 11 per cent. in the amount of water in the stool. This increase renders the fæces softer and, therefore, lessens the resistance offered to the intestinal mucosa. It is also responsible for the increase in intestinal volume which stimulates the peristaltic tension reflex.

When bassorin is allowed to absorb water, the resulting product resembles a jelly which is softer in consistency than that produced by agar. Swollen gelatinous particles can be observed in the fæces with the naked eye, and microscopical examination shows that they contain neither undigested nor partially digested particles of food. Neither free starch nor undigested meat fibres could be demonstrated in the stools examined, and this fact affords confirmatory evidence that bassorin has not any effect upon the digestion of food.

Clinical observations made in the above cases leave no doubt that bassorin will relieve constipation and that it will do so without causing digestive disturbances. Schindler[15] has demonstrated by X-rays that it accelerates the passage of the intestinal contents, and Berg[1] states that it will overcome the constipation produced by tincture of opium. As it can be shown by experiment that bassorin is without direct action upon the musculature of the intestine, it must be assumed that the laxative effect which it produces is due solely to its property of absorbing water and of increasing the bulk of the intestinal contents.

An aqueous extract of bassorin can be injected intravenously into a rabbit without any ill-effect whatsoever, thus affording strong evidence that this substance is free from any toxic properties. Neither has it any irritant action upon the intestinal mucosa. I have left 1 gm. in a 12-inch loop of intestine of a cat anæsthetized with urethane for 5 hours, and, although all free fluid in the intestine had been absorbed, there was not any sign of irritation. Similarly, 1 gm. of agar placed in an adjacent loop did not cause any irritation, but at the end of this period it had not expanded to such an extent, neither was all the free fluid in the loop absorbed.

Bassorin is therefore a mechanical laxative which is considerably more effective than agar. It is entirely free from the objections possessed by liquid paraffin, in that it has no action upon the digestive processes.

CONCLUSION

This brief survey of the more commonly employed mechanical laxatives indicates that there are several important variations, both in the properties and in the mode of action, of substances which are frequently employed to produce the same therapeutic effect. It is quite clear, for example, that such good results cannot be expected from the administration of a swelling substance, such as bassorin, in those cases in which the intestinal musculature is weakened as from the administration of liquid paraffin. In these circumstances, the expansion of the former is without effect upon the weakened muscle, while the purely lubricating action of liquid paraffin is of considerable advantage.

The effect of liquid paraffin upon the digestion of foodstuffs and upon the absorption of the products of digestion has often been debated. Dr. Hurst, to whom I am much indebted for valuable criticism, has suggested[5] that emulsions of liquid paraffin are frequently successful when the oil alone is not well tolerated, and causes seepage. The experiments quoted above confirm this view and indicate that liquid paraffin, when present in the stomach in an unemulsified condition, will retard digestion. In this connection the part played by natural emulsifying agents present in foodstuffs must not be forgotten, for these substances are present in large amounts in green vegetables and fruits, which are frequently prescribed to be taken in conjunction with liquid paraffin. The employment of an emulsion, however, should be sufficient to prevent undesirable effects in all cases.

With regard to purely hygroscopic substances, the distinction between bassorin and agar is very marked. The former is a far greater hygroscopic substance, and can be taken in much smaller quantities in order to produce the same therapeutic effect. One teaspoonful of bassorin, on the basis of the figures quoted above, is equivalent to two tablespoonfuls of chopped agar, and these quantities will expand to the same volume. Both of these substances are, so far as can be ascertained, without action upon the digestive processes.

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The Diagnosis and Treatment of Some Common Intestinal Protozoal Infections

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PRACTITIONERS in this country often encounter gastro-intestinal conditions of a chronic and persistent character which may baffle diagnosis and fail to respond promptly to the usual remedies. In children and adults the clinical symptoms are by no means indicative of an infestation of the intestinal tract with animal parasites, and thus the origin of the symptoms may be entirely overlooked.

While it is a practice in tropical and sub-tropical countries and in hospitals for tropical diseases in this country to examine the fæces of all cases as a routine for the presence of protozoal or helminthic infections, it is the case that in this country and other temperate zones the stools are not examined microscopically unless there is a distinct intestinal disturbance associated with a previous residence in the tropics. Every case with chronic intestinal symptoms giving a history of residence in a hot climate ought to have the fæces examined for evidences of intestinal parasites.

Five species of amœbæ and five species of flagellates inhabit the human intestines in a percentage of the indigenous population of this country, and as a rule little importance is attached to such infections. Of these ten species it is only intended to deal with three, viz.: the pathogenic amœba of man, *Entamœba histolytica,* and two flagellates, *Giardia lamblia* and *Trichomonas hominis*. *E. histolytica* is the causal organism of amœbic dysentery and liver abscess, and the two flagellates are associated with the so-called flagellate diarrhœas.

AMŒBIASIS

Amœbic dysentery manifests itself in acute, subacute or chronic infections of the large intestine. Varying degrees of ulceration occur in the intestinal wall, and a certain proportion of such patients develop hepatic abscess, which may be difficult to diagnose. In patients who have never been out of Great Britain, either acute or chronic amœbiasis is rare, but the disease certainly occurs in this country and northern Europe, and it should be excluded in all cases of chronic colitis. During the Great War the fæces of every convalescent dysentery case was examined once or several times in order to determine whether or not they were "carriers." At the same time observations were carried further and extensive intestinal surveys were made on men, women and children who had never been out of Great Britain. These investigations were of such importance that a special memorandum by Dobell (1921) was issued by the Medical Research Council. The fæces of over three thousand individuals, who had lived all their lives in Great Britain, showed the presence of the cysts of *Entamœba histolytica* in 3·4 per cent. of cases. Dobell pointed out that although *E. histolytica* is, and can be, a cause of human amœbic dysentery, it is, as a rule, comparatively harmless to the person it inhabits and may cause little or no inconvenience to its host. Very similar findings have been made in Europe, America and other temperate zones. The occurrence of a pathogenic amœba in the intestines of healthy individuals, unassociated with either a past history of acute dysentery or chronic symptoms, has puzzled clinicians and pathologists. This led Brumpt to conclude that there may be another amœba, namely, *Entamœba dispar*, which is, perhaps, of very low pathogenicity, but otherwise is quite indistinguishable in its morphology from *Entamœba histolytica*. If this view is correct it serves to explain the occurrence of healthy carriers of cysts. It must be admitted, however, that a large number of observers in this country have not been able to accept this suggestion. Simic (1931), working in Jugoslavia, supports Brumpt's hypothesis. It seems quite unnecessary to assume that there are two species of amœbæ, the one pathogenic and the other harmless, which are indistinguishable morphologically.

It has been clearly demonstrated in other protozoal infections that, in addition to variations in the virulence of different races or strains of the parasites, certain individuals may be highly susceptible, others only moderately so, while a proportion are definitely refractory to infection. Apart from the absence of any specific morphological differences it is obvious that the two factors, viz.: the resistance of the host to invasion and variations in the virulence of the organism may explain how perfectly healthy individuals can harbour the pathogenic amœba in their intestines without symptoms of disease.

This explanation is necessary in order that the practitioner may be able to assess the relative importance of reports on the fæces of his patients, for example, when cysts of *Entamœba histolytica* are found, the question arises as to whether any form of specific treatment is necessary. Whether a symptomless carrier, who has never been out of England and has never suffered from dysentery, should be treated or not, is a matter possibly of little importance. In actual practice this problem seldom arises because an examination of the fæces is seldom carried out except when signs and symptoms of intestinal trouble are present. The possible occurrence of intestinal amœbiasis and liver abscess must be borne in mind, as such cases, although apparently rare, have been reported even in persons who have never been out of Great Britain. Amœbic infections are often insidious and long-standing complaints so mild in character as not to urge the patient to seek medical advice and treatment. Vague abdominal discomfort, mild tenderness over the colon, especially the cæcum, flatulence, gaseous eructations, loss of weight and a tired feeling are common in chronic amœbiasis. Diarrhœa may occur, but just as frequently there is constipation. Obviously such symptoms are associated with many other conditions, and, in the absence of more acute manifestations, such as the presence of blood or mucus in the stools, the correct diagnosis may be missed unless the fæces are examined for the parasites or the sigmoidoscope is used for the detection of the typical ulceration. Liver abscess, especially with its ill-defined symptoms, may not be suspected.

The diagnosis of amœbic dysentery.—This form of dysentery is fortunately a rare disease amongst the indigenous population of Great Britain, but when it does occur it must be differentiated from bacillary dysentery and various types of colitis. In acute or sub-acute exacerbations of the disease the stool macroscopically is characteristic. The blood-stained mucus is a chocolate colour. If the stool is diarrhœic it may have the typical " sago grain " appearance, which consists of small blobs of mucus suspended in a fæcal stained fluid. This is well seen if the stool is transferred to a shallow glass plate. The diagnosis is clinched by the use of the microscope. The cell picture is remarkably free from polymorphonuclear leucocytes and, indeed, cells of any kind may be few and far between. The presence of Charcot-Leyden crystals, as emphasized by Thomson and Robertson (1920–21), strongly suggests amœbic infection, and, if motile amœbæ containing red blood corpuscles are seen, the diagnosis is complete. In chronic amœbic dysentery there may be little blood or mucus. The stools actually may be formed and the small traces of mucus may be missed by the naked eye. In such instances the diagnosis is made by the finding of the characteristic cysts.

The treatment of amœbic dysentery.—The experience of numerous observers indicates that four preparations (namely, emetine, yatren, stovarsol and bismuth) are of value in treatment. During an acute attack of amœbic dysentery injections of emetine hypodermically are by far the most efficient method of controlling the condition. Twelve injections, each of one grain, should be given to an adult as a single course. It is inadvisable to continue the drug for a longer period owing to its toxic action, especially on the heart. The patient should be kept in bed during the treatment, on a light diet. After this treatment the patient may feel quite well, but it must be remembered that there is a tendency to relapse, and it may be necessary later to administer another course of a similar character. In any case therapeutic measures ought to be controlled by the examination of the stools for cysts.

Manson-Bahr (1931) described in detail what is known as the combined treatment for chronic amœbiasis. In long-standing chronic infections emetine is given in the form of emetine-bismuth-iodide (E.B.I.). Unfortunately, this treatment is unpleasant, extremely trying to the patient, and difficult to carry out unless under hospital conditions. Indeed, some patients cannot tolerate it. The drug is given by the mouth in three-grain doses as a maximum for a man and two grains for a woman. The length of the course varies from ten to twelve days. As an adjuvant, yatren has been introduced and now it would seem that the combined E.B.I. and yatren treatment holds the first place in the eradication of chronic amœbiasis. Yatren can be administered in three different ways: as a four-grain pill, of which six pills daily can be taken; in cachet form, each containing seven and a half grains, twice daily by the mouth; or by an enema of 200 c.cm. (8 ozs.) containing five grains of yatren powder (i.e. a 2·5 per cent. solution). In the doses mentioned above yatren is liable to produce intestinal disturbances and diarrhœa. This disadvantage can be overcome by administering the yatren in an enema. This method has many advantages. Before administering the yatren enema the bowel should be cleaned out with a 2 per cent. solution of bicarbonate of sodium. Twenty minutes later the yatren should be injected and retained for as long as possible. This can be done for six to eight hours. The drug seems to exert a remarkable healing effect on amœbic ulcers.

A useful routine is as follows: The yatren enema is given in the morning and the E.B.I. by the mouth at night on an empty stomach, otherwise it will be vomited. Patients cannot keep E.B.I. down until they become accustomed to it. Manson-Bahr, therefore, begins with one grain on the first night, increases to two on the second, and on the third and subsequent nights continues with three grains. Some patients cannot tolerate more than two grains at any time. The drug is exhibited in gelatin capsules (not keratin-coated) and no food is permitted for at least three and a half hours before its administration. As a sedative one grain or one and a half grains of luminal or ten minims of tincture of opium may be used. Vomiting in the early hours of the morning is common, but may be regarded as of little relative importance. During the daytime a fairly liberal diet is permissible for the appetite is usually good. Manson-Bahr quotes the following as a sample daily regimen. Breakfast at 7.30 a.m. consists of tea, toast and lightly-boiled egg, and lunch of boiled fish, chicken and jelly. A light tea with toast and sponge fingers is given at 4 p.m. The patient *must* be kept in bed, no matter how fit he feels.

Willmore (1931) substitutes auremetine for emetine-bismuth-iodide. This preparation is a compound of the dye auramine with the hydriodide periodide of emetine. Auremetine, in grain doses, is given four times daily in soft gelatin capsules on alternate days. On the days when the auremetine is not given, stovarsol, four grains three times daily, is substituted. The auremetine administered during twelve days' treatment is 48 grains, and the stovarsol for a total of seven days is 84 grains. Should a rise of temperature ensue, or a rash appear, it is an indication for the interruption of treatment for a few days during which the stovarsol should be stopped altogether. Also, alternating with the administration of auremetine, Willmore gives an enema of yatren. He starts with one litre of a 2 per cent. solution on the first two occasions, and subsequently gives a litre of a 4 per cent. solution. Lastly, during the whole course of treatment, a heaped teaspoonful of bismuth is given three times daily each day.

INTESTINAL FLAGELLATES

The only two intestinal flagellates which it is necessary to consider from the clinical point of view are *Giardia lamblia* and *Trichomonas hominis.* Much has been written in the literature on the question of their pathogenicity to man. Both occur in the indigenous population of this country, and *Giardia* is very common in children, but less so in adults. *Trichomonas,* as indicated by extensive intestinal surveys in this country, is a rare parasite. In the tropics, on the other hand, it is of frequent incidence in diarrhœic and dysenteric cases.

Giardiasis or lambliasis.—In an intestinal survey of about 3,000 individuals in Great Britain, *Giardia* occurred in 9·2 per cent. It is a rare infection in children under one year, but Nutt, in Leeds, found it in six children varying in age from three weeks to twelve months. The writer, through the courtesy of Dr. Bernard Myers, had the opportunity of examining the fæces of a large number of children of all ages in

London and found 8 per cent. infected. Some of the infections were massive and possibly were responsible for gastro-enteritis and colitis. The youngest child found infected was one year and nine months old.

Many authors, especially clinicians, are of the opinion that *Giardia* is pathogenic and may be responsible for varied symptoms associated with nutritional disturbances, indigestion, abnormal frequency of defæcation, diarrhœa, mucous colitis, abdominal pain and tenderness, nausea, flatulence, nervous irritability, languor, headaches and nocturnal enuresis. The majority of parasitologists hold the view that there is no evidence to prove that *Giardia* can cause diarrhœa, chronic dysentery or any pathological changes in the duodenum or gall-bladder. The parasite establishes itself in the duodenum and jejunum where it may exist in enormous numbers. Since the introduction of duodenal intubation it is frequently demonstrated in the duodenal juices. It is suggested that the parasite may beset the duodenal mucosa so closely as to interfere with the gut function. It has also been described in the bile passages.

Taking into account that the habitat of this flagellate is the upper part of the duodenum, it seems quite feasible that the organism might cause certain symptoms, especially in children, with nutritional disturbances, indigestion, diarrhœa and the passage of mucus. Children with massive infections may be the subject of nervous symptoms, such as irritability and sleeplessness. The diagnosis can only be made with certainty by a microscopic examination of the fæces or duodenal juices. As regards treatment, it is a difficult flagellate to eradicate, but stovarsol by the mouth seems in many instances to reduce the intensity of the infection and tends to produce an improvement in the general condition.

Trichomoniasis.—Trichomonas hominis, in this country at least, is a parasite of little importance. It inhabits the large intestine. In the tropics it is frequently encountered in the stools of diarrhœic and dysenteric cases, but its causal relationship to these conditions is doubtful. Escomel, in South America, in common with other workers on the subject, states that *Trichomonas hominis* is usually a benign parasite, but, under certain circumstances, may become virulent and even cause a fatal dysentery. Wenyon has shown that in morbid conditions of the mucosa it may be capable actually of invading the tissues. This flagellate has been described in the pus of a liver abscess, and it can ingest red blood corpuscles. The view that *Trichomonas* is pathogenic has received little support from parasitologists, who think that it is an accidental concomitant to some other inflammatory state of the gut.

A similar parasite occurs in the human mouth and in the vagina. It has also been described as occurring in the bladder, thus causing cystitis. In this country Andrews (1929) found *Trichomonas vaginalis* in 20 per cent. of women examined at a clinic in London. The organisms, however, could not be associated in a causal capacity with any disease condition of the genital tract. Its incidence was much higher in cases of gonorrhœa. At Philadelphia 500 gravid women were studied, and in 23·6 per cent. *Trichomonas* occurred in the vaginal secretion. It was stated that almost all those infected had an abnormal vaginal discharge, and occasionally a punctate hyperæmic condition of the mucosa, but it was not constantly a cause of vaginitis in pregnant women. The treatment recommended was antiseptic vaginal douches.

OTHER FORMS OF COLITIS DUE TO ANIMAL PARASITES

A brief account has been given of the symptomatology, parasitology and treatment of the two most important forms—important because of their frequency—of dysentery in man resulting from infection with animal parasites. This, however, by no means concludes the list of causes of colitis, which may be due to protozoa other than those mentioned above, nor does it contain any description of intestinal helminthiasis. It is clearly outside the scope of the present article to deal with the results of worm infection of the human gut, but some indication is called for with regard to the other protozoal infections.

Both malaria and kala-azar, neither of which is primarily a disease of the gastro-intestinal tract, may nevertheless involve, sometimes very seriously, the gut mucosa. In malaria this involvement is due to blockage—the word " impaction " might almost be used —of the smaller mucosal and sub-mucosal capillaries with parasites. The disease kala-azar only rarely affects the gut to any extent, but when it does, accumulations of reticulo-endothelial cells are formed in the villi of the duodenum and jejunum. This reticulo-endothelial proliferation may tend to cause degenerative changes in the surface mucosa. The danger in the two diseases under discussion is not so much that they will mask or hide a true dysentery, but that, the attention being drawn to the colitis, the diagnosis of malaria or kala-azar may be delayed or missed.

Balantidiosis and coccidiosis are distinct clinical entities, but even abroad are rare. The former is the result of infection with a ciliate, *Balantidium coli,* which inhabits the large intestine. Just as in the case of *Entamœba histolytica,* the majority of infections are of the chronic type below the " clinical threshold," but occasionally the ciliates may invade the mucosa, burrow in the sub-mucosa and cause ulceration of varying degrees of severity. The diarrhœa is severe and intractable, and the resulting emaciation and anæmia may be very intense. Many of these more serious cases go on to a fatal termination. Stovarsol, benzyl benzoate *per os* and quinine solutions *per rectum* have been found efficacious in treatment, and bismuth is used as a palliative for the cramps, colic and diarrhœa. No line of treatment can be considered as specific. Infection may be acquired from " carriers " or by contamination with the fæces of pigs in which *Balantidium coli* is a common parasite.

How man derives the rare sporadic cases of coccidiosis is not known. In this disease the causal organism, *Isospora hominis*, multiplies and has its being in the epithelial cells of the mucosa, and causes their destruction. No fatal cases are on record, but a severe and debilitating diarrhœa may persist for about six weeks or longer. Spontaneous recovery without treatment is the rule.

Lastly, in conclusion, mention must be made of the controversy which is at present taking place as to the part played by spirochætes in the causation of chronic colitis. It has been found that in certain cases, for which no ostensible cause, either bacterial or protozoal, can be adduced, the plentiful mucus is literally swarming with *Spirochœta* (*Treponema*) *eurygyrata.* The absence of any assignable cause for the colitis other than the spirochætes is practically the sole evidence in favour of the spirochætal theory, whereas the fact that *T. eurygyrata* is common in the intestines of healthy individuals lends colour to the belief that its increased numbers are due to the favourable conditions provided for growth and multiplication by the chronically inflamed state of the gut wall.

Lumbago and Allied Conditions

By JAMES B. MENNELL, M.A., M.D.
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THOSE who have reached middle life without experiencing pain in the lower part of the back must consider themselves particularly fortunate, even though attacks of pain in this region are generally of short duration, and recovery is more or less spontaneous. The victim, however, is usually in sufficient distress to apply some form of treatment, or to seek a prescription for his relief. It is not unnatural to attribute spontaneous recovery to the treatment applied, though actually recovery often takes place in spite of the treatment and not because of it.

The complaint is a frequent one, so the number of suggested remedies is legion, and each has its firm advocates. Our first aim must be to inquire into the common factors of these various remedies, and to them must be attributed the praise and popularity of the " cure." Then we must endeavour to establish a connection between the pathological conditions present and the way they can be affected by the suggested remedies. Those patients who do not recover so rapidly will still remain for consideration, both as regards causation and treatment.

Heat or rubbing are the only two remedial factors common to all the multitudinous household remedies available for relief of backache. One or other or both must be employed with every form of remedy for external application. Most of the remedies act as rubifacients, though the menthol group is also much favoured. Factors common—either separately or combined—to all internal remedies are the increase of fluid intake and the administration of an analgesic. These remedial factors will now be considered.

EXTERNAL REMEDIES

Heat.—Conducted heat would seem to be an instinctive remedy, and perhaps it has the most advocates. A hot-water bottle, an electrically heated pad, or a hot bath are all simple forms of it. Then there are the various forms of home-made poultices, cataplasma kaolin co., antiphlogistine, and the many mud-pack preparations. A hot iron applied over brown paper combines heat and rubbing, and. in a lesser degree, the same can be said of the hot bath. All the poultice group have the advantage of supplying support, and so combine an element of splintage with the heat. This permits the relaxation of any protective spasm which may be present. In this respect the hot bath is unique, as, owing to the elimination of gravity, it allows relaxation and also freedom of movement when the tendency to spasm has passed.

Radiant heat is also a popular remedy, and there are many forms of heat-lamp on the market. They have little merit beyond convenience for administering heat to a patient recumbent in bed, and are probably a disadvantage when compared with other remedies, except as counter-irritants. The red glow of an incandescent burner from a gas or electric stove is far more potent in the infra-red, or actual heating, rays. Contrary to the common belief, ultra-violet rays convey no heat. The delusion that they do so is no doubt due to the popular description of an ultra-violet lamp as a "sun-ray lamp." Carbon and tungsten arcs emit a large amount of heat with the ultra-violet waves. The most penetrating heat is obtainable from a good-class infra-red-ray lamp.

Massage or rubbing.—This is so potent for good that, though it varies very much in different hands, it is often efficacious in spite of ignorant application. It requires gross abuse before its efficacy can be altogether destroyed; scientifically and skilfully administered it will often succeed where less enlightened treatment has completely failed to alleviate, or has even increased the severity of the symptoms. Aids to rubbing are on the market in the form of wooden rollers and vibrators, either hand-driven or electric.

The best remedy for any complaint is selected by studying the methods of treatment employed in the countries where the complaint is most prevalent. Low backache appears to be particularly common in China, and the Chinese masseur deals with the condition by picking up folds of skin with the index and middle fingers when the middle phalanges are flexed to a right angle with the proximal. This is a tedious and clumsy business, and not to be compared with the old-fashioned remedy of dry cupping. Any ordinary glass can be used for this purpose. It is heated in hot water, the rim pressed on the skin, and then allowed to cool. The skin is thus sucked up into the glass. Various cupping glasses can be bought, the best type is provided with a rubber bulb which produces the suction, and the glass can easily be slid along the surface of the skin, if it is previously smeared with oil or white vaseline.

Ointments, liniments and similar applications.—The prescription for these—with few exceptions—runs "to be well rubbed into the part affected." It may be stated at once that the amount of medicament absorbed is very small, that it can only be absorbed into the lymph spaces, and that, on account of the rubbing, it must be dispersed very rapidly into the general lymphatic system. Any local action must therefore be very transitory, and is doubtless of negligible consequence. The actual rubbing is efficacious, and as all are to be "well rubbed in," doubtless the word "in" has led to the misconception that it is the absorption that does the good rather than the rubbing. Some advantage may be gained from the substances containing menthol or a rubifacient matter. These act as counter-irritants much in the same way as the radiant heat derived from the incandescent-light lamps.

INTERNAL REMEDIES

Medicinal waters.—The merits of the properties of the waters of the various spas are all lauded to the skies by their respective advocates, yet these vary in composition so much that they must all owe their potency to a common ingredient—of which the only one is water. This naturally does not apply to the waters which have a definite aperient action. Some may have a definite selective action and stimulate the activities of the kidneys, but any increase in fluid consumption gives this result. It occurs whether the water is hot or cold, whether it contains lemon and is called lemonade, ginger and is called ginger beer, a few tea leaves and is called weak tea, or barley and called barley water. The water is always present, even if a little whisky is added to ensure that it is imbibed.

Various medicaments.—The salicylates are the most popular of the variety of medicaments prescribed, and of them caffeine-salicylate should probably be given the place of honour. It acts as a definite aid to excretion, but it is the common salicylic element, as it was the common water element in the previous paragraph, that does the good. The opium derivatives hold the palm as remedies for allaying severe pain, and one could not wish for anything more potent and efficacious than 10 grains of Dover's powder and 10 grains of aspirin, washed down with a long drink of lemon and hot water, with an ounce of whisky added. If there is intense muscular spasm and the pain is caused chiefly by cramp, an injection of 10 c.cm. of a ½ per cent. novocain solution into the muscles will sometimes act as if by magic.

We will now endeavour to ascertain how these several remedies can affect the various existing pathological conditions. With the exception of the internal medications, all the remedies mentioned so far aim at securing two effects. The first and most important is to encourage more efficient working of the lymphatic system; the second—perhaps only a corollary of the first—is to restore freedom of movement. Possibly some little understood reflex effect follows cutaneous stimulation as produced by heat or counter-irritants. Unfortunately, we encounter many cases of low backache for which these comparatively simple remedies afford no relief.

DIAGNOSIS

The symptoms may produce a condition varying from an occasional mild annoyance to one of complete incapacity. It must be remembered that the spontaneous appearance of backache, which begins as a scarcely noticeable ache, but tends to increase steadily, may, in patients past middle life, be the first symptom of deep seated trouble, such as carcinoma of the pancreas or prostate—to quote two recent examples. Pain in the back must always be regarded as a grave symptom in patients who have had any form of malignant disease, whether previously operated upon or not. The diagnostician must always bear in mind the possibility of tuberculosis and Paget's disease, though in either case definite diagnosis depends on X-ray examination, at least in the earlier stages. Tuberculosis calls for complete and prolonged rest, and Paget's disease for a six months' course of general ultra-violet light combined with the administration of parathyroid and calcium, preferably in the form of ostelin.

Backache, as part of a general condition, may be due to absorption from a septic focus, and relief often comes after the removal of a tooth with an abscess round the root, a septic tonsil, or after attention to intestinal absorption. Colonic irrigation with a weak solution of potassium permanganate has relieved many an inveterate case. There are frequent reports of almost dramatically rapid "cures," and it can only be supposed that these are examples of relief from a visceral reflex.

Persistent pain in the lower part of the back may be due to local causes. The only joints that need consideration in this region are the sacro-iliac and the lumbo-sacral. We were taught, in the past, that the sacro-iliac joint was a synchondrosis and that no perceptible movement took place there. This theory is proved to be an error by measuring the space between the posterior-superior spines of the ilia with the patient first in the sitting position and then in the prone position (forward lying) and by comparing the two measurements. It is not unusual to find a difference of half an inch or more. This can only be due to the fact that, with the change of position, the ilia have rotated backwards on the sacrum in response to a backward torsion strain (clockwise rotation). The knowledge that this joint has a definite, though naturally limited, range of normal movement—the presence of a joint cavity with a synovial membrane should be adequate proof—tells us that it is liable to all the ordinary changes which may beset a joint in any situation.

Trauma will cause traumatic synovitis; prolonged strain will cause stretching of the ligaments with associated pain, as in some cases of flat foot; prolonged forward torsion strain will cause the ligaments on the back of the joint to become sensitive. An examining thumb is placed over the posterior-superior spine of the sacrum and is then made to slide first outwards and then inwards. If, on pressure over the former point, tenderness is detected, it is due to a sensitive deposit in the structures over the gluteal aspect of the posterior superior spine. If the tenderness is over the inner point, then it is probable that the posterior ligaments of the sacro-iliac joint are strained and sensitive. Sensitiveness in the anterior ligaments can be detected by examination of Baer's sacro-iliac point (of which mention should be made in every medical and surgical textbook, though it is usually completely ignored). If the tenderness is increased by pressure backwards on the anterior superior spine of the ilium, and decreased by pulling forwards the crest from behind, then we have positive proof that it is caused by the sensitive ligaments.

If the coccyx is not free to move, then any backward torsion strain of the sacro-iliac joint will lay undue strain on the ligaments uniting the coccyx to the ischium. Tenderness in these ligaments can only be detected per rectum. Backache does not often arise from this cause, but when it does it is intractable. Cure depends on one of three things : first, restoration of mobility to the coccyx; second, its removal; third, the continuous wearing of some apparatus to limit movement of the sacro-iliac joints on the sacrum. If there is any uncertainty as to the ligaments being sensitive, the sacro-iliac joints can be moved so as to occasion ligamentous strain. A backward torsion strain is laid on the joint whenever the hamstrings are stretched while the hip is flexed forwards. If, in the recumbent position, the leg is raised with the knee extended, there is tension on the hamstrings, and therefore on the ischial tuberosity. This causes the whole os innominatum to rotate backwards (counter-clockwise) on the sacrum.

Trouble within the joint will not only cause pain locally, but also will make it radiate down the leg. It is important to differentiate between pain referred from this movement of the sacro-iliac joint, and pain due to tension on the sciatic nerve. If the foot is dorsi-flexed (Fig. 1) when pain is first noticed, increased tension is laid on the sciatic nerve by the pull on the terminal branches, but no extra tension is laid on the hamstrings—if the movement is carefully performed. If the hip is further flexed, when the point is reached that the ilium is fully rotated backwards on the sacrum, the further movement must be transmitted to the sacrum, and this then moves both on the opposite sacro-iliac joint and on the fifth lumbar vertebra at the lumbo-sacral junction. Any pain caused by trouble in the lumbo-sacral joints will, at this point, be felt in the middle of the back. If the pain is due to movement of the sacrum on the ilium of the opposite side, it is caused by a forward torsion strain of this joint. Now the pain will be referred to this opposite side, and possibly down the leg. In the side-lying position, a backward torsion strain can be laid directly on the joint by pulling back the anterior superior spine with one hand, while pushing forward the ischium with the other (Fig. 2). A forward torsion strain can be produced by hyper-extension of the thigh with the knee flexed, as this lays strain on the rectus and on the Y-shaped ligament.

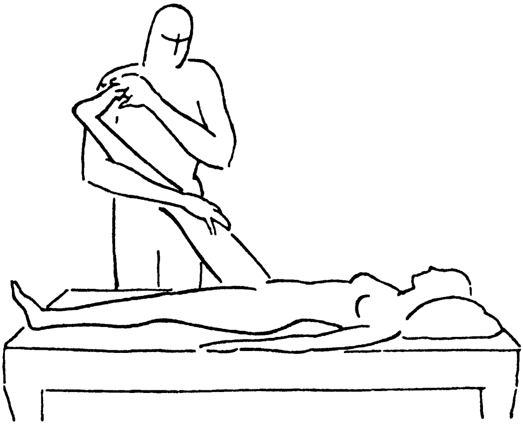

FIG. 1.

This and the following illustrations are reproduced from the author's monograph "Backache," by courtesy of the publishers, Messrs. J. and A. Churchill.

The strain is confined to the sacro-iliac joint if the pelvis is fixed as shown in Fig. 3. If pain is produced in this position it may be relieved by releasing the knee of the opposite side, thus transferring some of the strain to the lumbo-sacral junction. Pain from abnormal movement of the sacro-iliac joint can be relieved in this way. Further forced movement will soon bring the lumbo-sacral junction and the joints of the lumbar spine to the limit of normal movement, and strain will

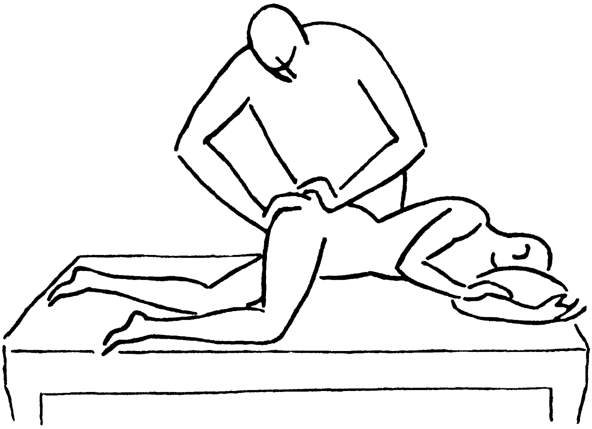

FIG. 2.

again be felt on the sacro-iliac joint. Should the pain reappear we have a sure diagnostic sign. If the movement is painless in the position shown in Fig. 3,

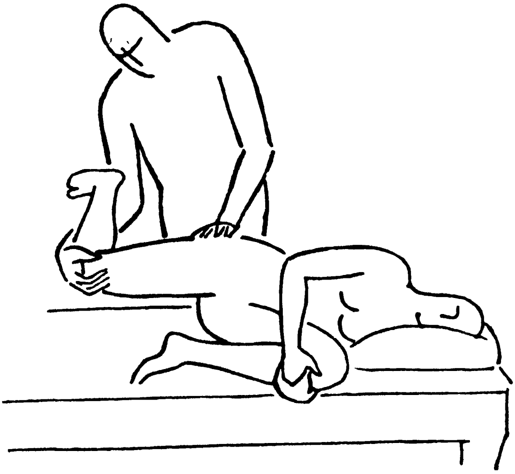

FIG. 3.

but painful when the left knee is released, then it must be caused by movement at the lumbo-sacral junction or in the lumbar spine. All these movements can be checked with the patient in the prone position, as shown in Fig. 4.

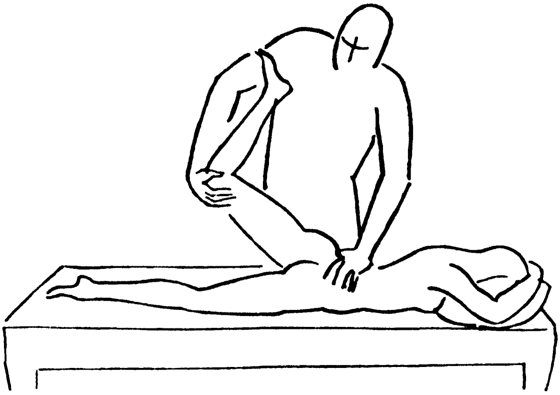

FIG. 4.

If the sacro-iliac joint is at fault it offers the same possibilities of treatment as any other joint. It can be fixed, supported, or moved. Fixation may afford the only chance of relief should the joint be flail and tend to lock frequently, but it is rarely necessary. Support may be given by a low corset, with a horizontal webbing band round the pelvis fixed to the corset by loops at a level just below the anterior superior spines of the ilia in front and across the sacrum behind. Further support in the form of plates can be used either with the corset or independently. The need for support is usually indicated when the patient complains of pain when both backward and forward torsion strain is exerted. Manipulation is advisable when pain is felt from torsion strain in one direction only. It is also the best treatment for all acute cases when pain has been caused by some unguarded movement, however trivial (e.g. stepping out of a bath). It will often cut short attacks of " traumatic lumbago " if it can be done immediately. Support should be provided after this manipulation.

Chronic strain due to posture—lordosis or flat-back deformities—should be treated by support, though occasionally manipulation is required as well. Side-bending movements of the lumbar spine should be examined as well as those already mentioned. This is best achieved with the patient in the lying position (Fig. 5). This manipulation also serves to release a lock and can bring relief to cases when the lumbo-sacral junction is locked, as so often happens when the fifth lumbar vertebra is situated unduly highly between the ilia. This position of the junction renders it unstable, and it is liable to lock easily. Should side-bending be painful in both directions it is well to support the joint.

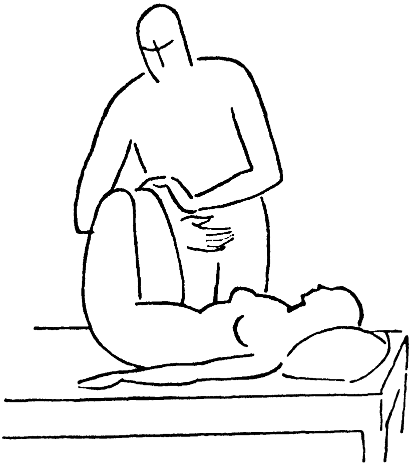

FIG. 5.

Certain bony abnormalities are also potential causes of low backache. An unduly large spinous process is liable to impinge on its neighbour during hyper-extension of the trunk. This trouble is found among tennis players, and the pain is due to the nipping of the soft structures between the bones. A suitable plate prevents the painful movement. If a " spina bifida " is present, the nipping is even more liable to occur. An enlarged transverse process of the fifth lumbar vertebra, or actual sacralization, is always liable to cause trouble—contrary to the usual teaching. If present, it means that there is little movement at the lumbo-sacral junction, so that if, as the result of any accident, the ligaments are stretched and there is an increase in mobility, this permits a nipping of the soft structures between the enlarged transverse process and the ala of the sacrum. These cases are extremely difficult to treat. The pain can be alleviated by drastic support, but any manipulation increases the severity of the injury, and fixation may be required for permanent relief.

As a last cause of low backache we must remember muscle strain or injury. It is the least frequent cause, although it is commonly given as a diagnosis on inadequate grounds. A definite diagnosis of muscle tear or injury can only be established after examining the suspected areas with Faradism. If the lesion is established it must be treated with Faradism. One cannot stress too much the fact that muscle injury is a very rare cause of low backache, compared with all the other causes mentioned.

This brief sketch of the causes and treatment of low backache should suffice to enable the practitioner to approach very near to an accurate diagnosis, and should indicate that more than the customary examination is necessary. No examination is complete until it has comprised inspection, palpation, and movement, in the sitting, standing, lying, side-lying, and prone positions. Sometimes it is also necessary to examine cutaneous sensation and muscle movement by testing with Faradism. It is impossible to prescribe accurate treatment unless there is an accurate diagnosis, so this diagnosis must be the first essential.

Some Minor Ailments of the Feet

BY HAROLD DODD, CH.M., F.R.C.S.
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OF the multitudinous painful, inconvenient and incapacitating ailments we are called upon to treat, those arising about the great toe form quite an appreciable proportion. Fortunately they can usually be met with an assurance of relief and often of cure. A smooth functioning great toe is essential for " unconscious " human locomotion. Being in constant heavy use, often comparatively neglected in ordinary care, placed in an exposed position and thus liable to trauma, no wonder that it and its neighbourhood are often the seat of disorders, usually slight, but fairly often partially or completely incapacitating. These are some of them :—The ingrowing toe-nail; the subungual exostosis; hallux valgus and rigidus, and the bunion; chronic " sores " about the hallux.

The present day fashion of smart but not always suitable footwear, of cheap and plentiful mechanical transport, which discourages the use and development of good leg and foot muscles, and of " hiking " crazes indulged in enthusiastically but with indifferent equipment, contribute to the frequent occurrence of these conditions. The prompt recognition and effective management of painful feet are very important, but unfortunately not generally the rule, the sufferers usually consulting the chemist or the chiropodist first.

THE INGROWING TOE-NAIL

In addition to tight shoes, tight socks, indifferent toilet and too vigorous manicuring, an ingrowing toe-nail is excited into an acute condition generally by a slight accident, and it usually passes into an obstinate, subacute ailment by using the homely remedies of poultices of bread, soap or linseed, iodine and baths. Its recurrence is ensured by the frequent, thorough clipping off of the corners of the nail, thus stimulating further ingrowth at the sides. A "whitlow-like" condition involving all of the hallux occasionally arises with one of the acute exacerbations.

Operations for removing all or part of the nail, or plastic procedures on the soft tissues of the toe need be mentioned only in order to condemn them emphatically, very rarely indeed should they be necessary, even in advanced forms. The treatment of the condition, tersely expressed, is to "leave the nail alone." This is carried out by the following measures :—

(1) Fitting shoes or boots of adequate size. Large enough socks or stockings, which must be frequently changed; that tight socks are playing a part in the causation of the pain about the hallux is suggested by its occurrence at some periods and not at others; with wear and washing socks shrink, becoming smaller and thicker, bunching the toes together in an unyielding embrace.

(2) A rapid daily bath to the feet and gentle slight touching of the granulations with a match stick dipped in tincture of iodine, and applying a small dressing.

(3) Cutting the nail with round-ended scissors, in the fashion shown by the diagram (Fig. 1) at weekly intervals. The corners and sides should be carefully avoided and snipped off only when they project beyond the end of the toe. By scraping the surface

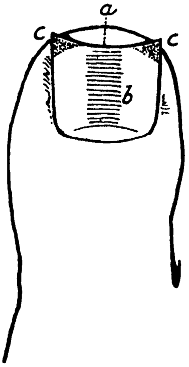

FIG. 1.—The ingrowing toe-nail showing :—(a) The method of cutting the nail (a); (b) The shaded area (b) is the surface which is scraped by the scissor blade or file; (c) The corners are not cut until they protrude beyond the end of the toe.

of the nail at its centre with a file or the blade of the scissors, growth is stimulated here and possibly slows the ingrowing tendency.

(4) All manicuring, baths, special dressings, insertion of woollen plugs, and fomentations are inadvisable and should be discontinued.

(5) During an acute attack the patient should lie up and compresses of magnesium sulphate and glycerin should be applied daily; no other active treatment is necessary.

Careful " follow-ups " of cases treated on these lines (they had all been well established before being sent to hospital for advice) justify the assurance that this method is sound.

THE SUBUNGUAL EXOSTOSIS

This is a small outgrowth of cancellous bone usually arising from the dorsum or sides of the terminal phalanx of the hallux; in my experience it afflicts women more often than men. Its periosteum is intimately associated with the nail bed, so that this new growth quickly interferes with the contour and unobtrusive function of the nail. The nail bed is elevated, usually unevenly, so that painful rubbing by the shoe ensues. The nail may be split and the outgrowth protrude, looking like the kernel of a hazel nut lying in its opened shell. X-ray examination is advisable in all persistent ailments of the hallux—it may reveal an unsuspected exostosis.

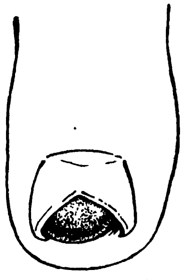

FIG. 2.—The subungual exostosis of the terminal phalanx of the hallux; the nail has been cut around it.

Prompt surgery is the treatment for it. This consists in the removal of all, or part of the nail to expose the swelling, incision and reflection of the covering nail bed, and shaving the bony outgrowth down level to the normal phalangeal surface, with a " scalpel sharp " chisel. The raw bone area left is made smooth and dry by rubbing in a little sterilized Horsley's wax. A dressing is applied and a light plaster of Paris to the foot, in which the patient walks after three days, followed by a stout shoe or boot. Complete healing is sometimes delayed for several weeks, but this does not incapacitate, while normal restoration of the nail may take up to three or even six months.

HALLUX RIGIDUS AND VALGUS

These may conveniently be considered together, as in most cases there is the same underlying cause, a flat foot. This deflects the foot outwards, and the line of gravity (and with it, body weight) instead of passing through the heads of the second and third metatarsals goes through that of the first, thus inflicting on the first metatarso-phalangeal joint abnormal weight and stresses, which slowly provoke in it the changes of traumatic osteo-arthritis, i.e. thinned cartilage, bony lipping around the dorsal and inner sides of the head, peri-articular thickening and callosities with limitation of function and a rigidus or valgus deformity of the big toe.

In hallux rigidus, while the line of the toe is normal, there is at first inability to extend the metatarso-phalangeal joint. Later there follows pain and stiffness on movements, which call for extension of the hallux, such as standing on the toes, " stepping off " in walking, or running up or down stairs. The interphalangeal joint compensates to some extent for this deficiency in dorsiflexion, but the extra strain occasionally causes an ingrowing or crumpled condition of the nail, thus emphasizing the necessity for a survey of the foot as a whole, even though the complaint is small.

There is a bony ridge, often visible through the patient's shoes, over the head of the first metatarsal; the skin here is thickened, later it is tender and reddened, until an adventitious bursa, popularly known as a bunion, develops (Fig. 3). This is liable to frequent and recurring attacks of bursitis, and on account of there being no obvious deformity, in the hallux rigidus condition, the cause may be unsuspected, and be diagnosed as " ? gout," " ? angio-neurotic œdema," " ? acute rheumatism " or " ? early thrombo-angiïtis obliterans."

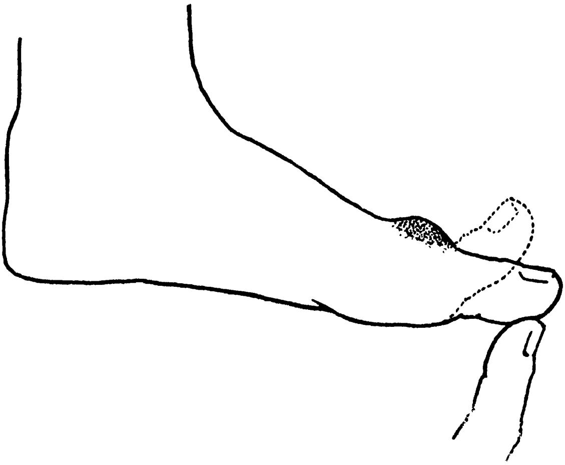

FIG. 3.—The hallux rigidus. There is no dorsiflexion even with the finger pressing under the big toe. The dotted outline indicates the normal range of movement. Note the dorsal situation of the bunion.

Hallux valgus may occasionally be combined with hallux rigidus, but it is a separate entity. It is characterized by the whole big toe pointing markedly outwards, either over, under or against the second toe (Fig. 4). Unbalanced muscular action in the presence of pes planus, unsuitable socks and shoes, are the exciting factors. With regard to socks, it is not generally realized how freely the foot perspires and that a sweat-soaked sock shrinks down and loses its elasticity. This is the explanation of the previous advice, i.e. to change the socks or

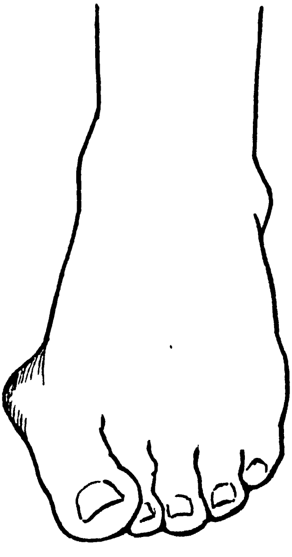

FIG. 4.—The hallux valgus. Note the bunion is on the inner border of the foot.

stockings frequently—and they must be large enough. The extra strains in this abnormal position cause traumatic osteo-arthritis in the metatarso-phalangeal joint. The changes are chiefly on the inner side of the unduly prominent head of the metatarsal, with osteophytic formation; while in the rigidus condition, it will be recollected, the bony changes are chiefly on the dorsum of the head. Pressure of the skin leads to an adventitious bursa on the inside of the head of the metatarsal, which is liable to inflammatory attacks, occasionally even suppurating with a surrounding cellulitis. When this arises, the danger of a septic arthritis is quite real, as sometimes the bursa communicates with the joint.

MANAGEMENT

I use the word " management " in preference to " treatment," as this expresses more aptly one's plan of action. It resolves itself into:—(1) The correction of the underlying flat foot. (2) The adjustment of the footwear to relieve the valgus or rigidus deformity. (3) The care of the feet. (4) The consideration of surgical operation. (5) The care of the bunion.

The flat foot.—A full description of this condition is outside the scope of this article, as a complete discussion of it would extend into many pages. Adequate provision for the arches of the feet is provided for by fitting patients with a good pair of well-designed, stout walking brogues for women, and an officer's or men's type of service boot (according to the patient) for men. The usual difficulty is to obtain sufficient width, but first-class boot-makers can usually supply this. Patients find, with considerable misgiving (especially women), that when their feet " go wrong," they are not only painful, but also larger; the steadily growing row and size of their unwearable shoes is indeed a grievous sight to them.

If sufficiently broad or suitable boots are not procurable, a bespoke pair will be necessary. Expense is usually a governing factor, thus I advise ready-made shoes first. Patients often demur about the cost, but when it is explained that the type recommended will probably outwear twice or thrice an ordinary pair and enable them to walk comfortably, they usually take the advice. Low wide heels are not essential, they discourage women wearing the shoes, and even cause pain on walking; a widish high heel suits the case. Robust boots or shoes need not necessarily be unsightly. To determine if the foot-wear is wide enough, the patient should stand in them, and the widest part of the foot felt and found to be equal to the width of the boot; often the foot will be felt to be "spilling over" the width available, as in Fig. 5.

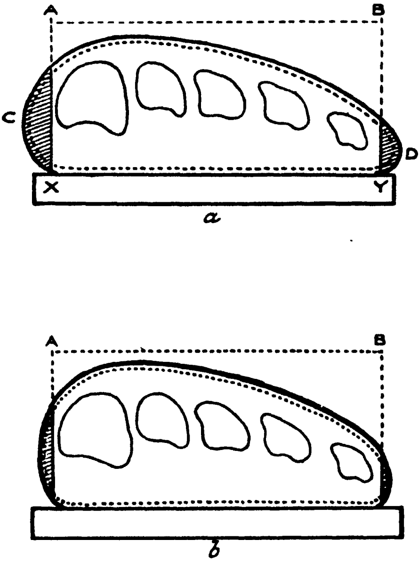

FIG. 5.—A diagrammatic transverse section of the "tread" of the foot. (*a*) Shows a badly fitting shoe which, not being wide enough, is bulging at the sides *C* and *D*; and the foot is "spilling" over the available width *AX*, *BY*. (*b*) Shows an adequately fitting shoe whose width *AB* is equal to that of the foot. Note the fit is determined by feeling the tension of the widest part of the "shod" foot when the patient is standing (not sitting).

The sole should be stout, say, $\frac{5}{16}$ in. for women and $\frac{9}{16}$ in. for men; thus it will retain its contour on uneven ground and not permit ground irregularities to be felt by the foot. Lace-up patterns are preferable; button-bar types do not give the shoes sufficiently firm purchase to the feet, in order to provide support on uneven ground. The inside edge of the shoe should be approximately straight, not curving in to a point. In a bespoke pair of shoes the ordinary stiffening can be carried further forward than usual, and in an advanced case, a piece of spring steel incorporated in the sole.

The corrections to the boot.—(*a*) *For the flat foot:* They aim at transferring the weight to its normal line and also at supporting the stressed areas. To relieve the inside, elastic longitudinal arch, the inner side of the sole and heel are wedged $\frac{1}{8}$ in. to $\frac{3}{8}$ in. (according to the amount of planus and valgus deformity of the foot); this transfers some of the weight to the outer longitudinal bony arch. To further support the inner arch, the inside of the heel is lengthened $\frac{1}{2}$ in. to 1 in. according to the size of the foot and the amount of flattening (Fig. 6). This is spoken of as crooking and elongating the heel. These measures will relieve the average pes planus when

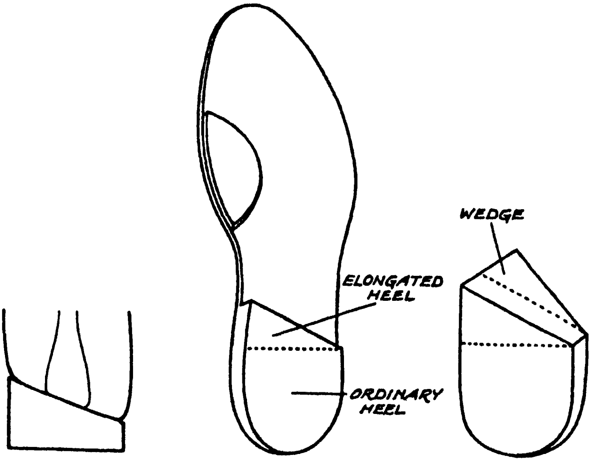

FIG. 6.—A shoe fitted with the inner side of the heel elongated and raised and the sole with an inside wedge (the latter is not obvious when placed under the sole, not "on it" as drawn here).

worn for three to twelve months, after which the need for adjustment may be no longer necessary. A severe degree may even need an outside iron with an inside T-strap to the boot for a time. This is a very positive support and will relieve pain in osteo-arthritic feet of old people; it can be made quite unobtrusive and light (of duralumin); the metal stay being inserted between the leathers of the upper, whilst in winter-time, ladies hide it under gaiters.

(*b*) ***For the hallux valgus and rigidus:*** These are relieved by placing a metatarsal bar across the sole behind the tread (Fig. 7). This takes the weight from the heads of the metatarsals and transfers it to the necks, thus relieving the metatarso-phalangeal joints. By making this bar wedge-shaped, so that the inside is, say, $\frac{5}{16}$ in. thick and the outside $\frac{3}{16}$ in., the weight is canted more to the outer part of the foot, away from the stressed hallux area, but this may not be necessary in all cases. Again, it is frequently necessary to prescribe differently for each foot, the amount being judged by observing the patient standing, from in front and behind with the shoes on.

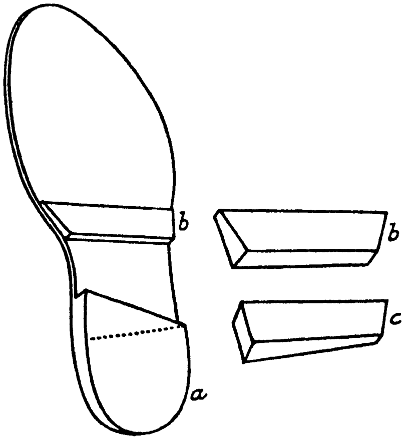

FIG. 7.—A shoe with the metatarsal bar (*b*). (*c*) Shows how the bar may, if necessary, be wedged from inside to outside.

There are several points with regard to the construction and placing of this transverse bar which are worthy of mention, as on them its success depends :—(1) Its position—it must be behind the tread, so that its front edge just touches the end of the tread. Often I find it placed on the tread, and accompanied with the report of " my feet are not better yet ! " (2) If the boots are new, the patient should wear them for three days before it is applied, in order to mark out the tread. (3) It must be " made-up " behind in order that its surface is parallel to the sole (Fig. 8). (4) These patients are heavy " walkers," the sole wears quickly and is best made of " driped." (5) If the shoes are bespoke, it can be incorporated under the sole, thus rendering this " surgical shoe " more acceptable æsthetically.

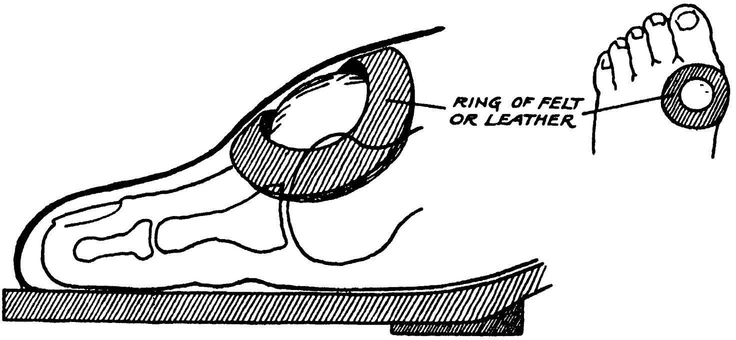

FIG 8.—Shows (1) the rationale of a felt or leather ring round a bunion, thereby lifting the shoe off it ; (2) the metatarsal bar under the neck of the metatarsal, and it also illustrates a constructional detail, the " making-up " of the bar behind.

The care of the feet.—From this, well carried out, a great deal of comfort is derived ; patients who regarded the instructions as " a lot of bother " speak enthusiastically about their effectiveness in a short time. The principles are explained at the first consultation and start at once, even though the boots, etc., are not yet ready. A card with the main points printed on it (the italicized sentences which follow) is given to them as a reminder :—

(1) *Scrub the feet and legs daily in hot water with a soft brush or loofah.*—This ensures a form of homely and effective massage to the feet and muscles of the calf; the actual bending is also beneficial to the abdomen.

(2) *Wear thick stockings or socks and change these frequently.*

(3) *Avoid Standing.*—Standing strains the already weakened calf muscles, calling for a sustained muscular effort, whilst walking calls for an effort alternating with momentary rests.

(4) *Walk with the toes pointing directly forwards, never turned outwards.*—This tends to throw the weight on to the outsides of the feet—that is, away from the strained inside arches. The old-fashioned custom of walking with the toes turned outwards is a mistake, but it is " dying hard."

(5) *Shoes or boots must be worn from the moment of getting out of bed, until getting into bed at night.*—This ensures arch support all day.

(6) *Never walk in soft slippers or in stockinged feet.*—This avoids unsupported arches.

(7) *When sitting, the feet should be put up on a chair or couch, if possible.*—This permits an easy venous return and removes the weight of the legs and thighs from the feet (this is considerable, as is readily realized when carrying an amputated limb, or holding a limb during operation. Whilst sitting thus, patients may remove their boots, but must put them on before moving.

(8) *Practice moving the feet and toes up and down about twelve times before or after food daily, also when in bed, on the bus or on the train.*—This retones the muscles of the feet and calf, and is definitely helpful, although it appears to be a trivial exercise. Later, walking on tip-toe and on the heels can be practised.

If faithfully carried out, relief is early, and ability to stand the racket of ordinary life, with the adjusted shoes, usually takes six to twelve weeks. After a year, some of the joint thickening and stiffness disappears.

The consideration of operation.—In bad cases it is necessary; in those of moderated degree it can probably be avoided, and in the early stage, is definitely not indicated. Persistent pain and disability are the indications. Gross deformity with marked changes in the joint shown by X-ray examination is quite compatible with a fairly comfortable existence. An inspection of feet in a public park on a Bank Holiday will quickly convince one of the long-suffering nature of the foot.

Just as a gastric or duodenal ulcer patient is not advised operation until dieting has been taught and a long course of medical treatment given, so no patient with a disability of the foot is offered operation until :—(1) the toilet of the foot has been practised; (2) suitable and corrected footwear has been fitted and worn for six to twelve weeks; (3) the effect of practising exercises to re-tone their foot and leg muscles has been tried out. Otherwise, by the neglect of these points, the results of perfectly performed operations fall short of the best possible. Briefly, the operation consists in the wide excision of the metatarso-phalangeal joint, in order to secure good mobility. With a " scalpel sharp " chisel the lipping is shaved off the metatarsal head and the whole base of the first phalanx of the hallux removed.

The care of the bunion.—If the bunion is distended and suppuration is suspected, early aspiration and incision if pus, should be carried out. This avoids a possible extension of infection to the joint. Rest in bed, evaporating lotions and firm bandaging to the well elevated foot quickly bring relief. When a subacute stage is reached, a hole cut in six or seven thicknesses of chamois leather or adhesive felt (obtainable in various thicknesses from the makers of Zopla plaster) to fit easily around the bunion (not on it), so that the shoe is lifted away from the inflamed area, quickly eases discomfort and the thickness of the ring can be gradually lessened (Fig. 8).

CONCLUSION

No mention of the hallux ailments would be complete without a reminder that very " obstinate " sores on it, say about the nail or callosities on the dorsum, side and under surface, may be due to tabes, nerve disease or a spina bifida occulta—the last is hinted at by a fatty, hairy tuft over the lumbar spine, and confirmed by X-rays. Patches of redness, small inflammatory foci, " weeping " corns in elderly people suggest diabetes or incipient gangrene, the latter often being confirmed by the X-ray of the leg showing calcified tibial arteries. This indicates the wearing of several pairs of socks or stockings and a generous stout boot, and great care in washing and manicuring to avoid an abrasion. It is a prudent policy to X-ray all painful feet; quite unsuspected bony changes are frequently revealed.

In particular would I conclude by mentioning the condition of *pied forcé*, which manifests itself by chronic discomfort and later moderate swelling over the shaft of the second or third metatarsal. Clinically and radiologically it may strongly suggest a fracture with a very mild reaction. After overuse of feet unaccustomed to strain, e.g. in army recruits and very enthusiastic hikers, a fracture of the shaft occurs quietly, without particular incident or pain. Early during the war, a battalion in France had two hundred men "confined to barracks" by "hysterical flat feet." X-rays were not so universally in use in those days, but a surgeon who saw some of them advised it, and ultimately numerous cases of *pied forcé* were revealed, caused by long route marches with full packs during intensive training. Treatment consists in supporting the feet adequately in a stout plaster or boot until X-ray examination shows sound bony union, in addition to care of the feet on the lines already described. This condition may account for a few of the cases of obstinate pain in the feet, which are cropping up at present due to "over-hiking."

Insomnia

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WHILE a frequent symptom in the course of many serious organic diseases, insomnia is very often the sole apparent departure from health for which a patient seeks relief. In every case a strict investigation must be carried out in order to discover its causes. These may be broadly classified into: (1) those due to physical disease; (2) those due to mental or emotional disturbances; and (3) purely external causes such as noise, cold or extremes of heat.

The more important physical diseases can be classified as follows: (*a*) pain or severe discomfort from injury or disease; (*b*) toxæmic states in many infectious diseases or in such conditions as uræmia; (*c*) disorders of the cerebral circulation in heart disease, altered blood-pressure and anæmia; (*d*) structural disease of the brain; and (*e*) indiscretions in diet and other disturbances of the alimentary tract. Among the mental or emotional causes a distinction should be drawn between those due to simple anxiety and those occurring in the true psychoses, either in excited patients or in those suffering from states of depression.

Insomnia due to pain is naturally the easiest to diagnose and often not difficult to treat. When the pain is really severe some form of opium or morphine is generally necessary. When the pain is less severe, or when the condition is one in which the prolonged use of some analgesic is likely to be needed, it is better to try to defer the use of opium as long as possible. The value of purely local remedies should not be forgotten. Thus heat, whether in the form of poultices or the popular antiphlogistine, or even the homely hot-water bottle, may just make all the difference between comfort and discomfort. And in this connection the great benefit that may be conferred by the old-fashioned leech in the pain of pleurisy or pneumonia may also be borne in mind when the use of opiates is for any reason contra-indicated.

Among the analgesic drugs that may be useful before opium or morphine is employed we may mention the following : aspirin, phenacetin, pyramidon or veramon; allonal is often very useful. A combination such as 5 grains each of aspirin and pyramidon with ½ grain of codeine or ⅙ grain of heroin hydrochloride may suit some patients. Instead of resorting to subcutaneous injections of morphine we may give opium by the mouth; for this purpose a choice may be made from many preparations, such as Dover's powder, pill saponis, tincture of opium, or nepenthe. Omnopon is also a valuable preparation which may be given by the mouth in a dose of ⅙ to ⅓ of a grain.

In many physical diseases the toxæmia of infection is often responsible for insomnia rather than any concomitant pain. In many of these conditions opium or morphine is again the best remedy. Thus in pneumonia either opium in the form of Dover's powder or morphine can be given in the earlier stages, and usually up to the fourth or fifth day of the disease, with nothing but benefit. The chief contra-indication to their use is severe cyanosis. If morphine is given in the later stages of pneumonia, in chronic bronchitis or in broncho-pneumonia in elderly patients, it is always wiser to combine atropine with it; 1/100 of a grain of atropine may be combined with ¼ of a grain of morphine. It is generally taught that paraldehyde is the safest hypnotic in pneumonia after the fourth or fifth day. To be effective, however, it must be given in a dose of not less than 2 drachms. Some caution is necessary in prescribing repeated or large doses of paraldehyde in the presence of much bronchitis, for its irritant action upon the bronchi during its excretion may serve to increase the bronchial inflammation. In the insomnia of chronic cardiac disease paraldehyde and chloral hydrate can both be recommended. The supposed dangers of the latter have been much exaggerated, and it can usually be given in doses of 10 to 15 grains without misgivings unless severe cardiac failure has already occurred. In the presence of cardiac dyspnœa, and for the nocturnal attacks of cardiac asthma, no hypnotic can compare with a subcutaneous injection of morphine.

The sleeplessness which is apt to be associated with high blood-pressure is often satisfactorily relieved by such sedatives as luminal in a dose of 1 to 2 grains at night, also by chloral hydrate. In chronic nephritis, especially when uræmia supervenes, much difficulty may be experienced in securing sleep. In the first instance a combination of 20 grains each of bromide and chloralamide may be tried; if this is not sufficient, 10 to 15 grains of chloral hydrate. The barbitone group of drugs are often depressant in these cases, but if simpler remedies fail 2 grains of luminal or 7 to 10 grains of medinal may be effective. The use of opium or morphine in chronic nephritis and especially in uræmia is certainly not unattended by risks. Often, however, nothing else will succeed, and the incurable nature of the disease is sufficient justification for the risk entailed. That form of insomnia due to an irritable cough is generally best treated by some form of linctus containing small doses of codeine, heroin, or the compound tincture of camphor. If the irritation arises from the pharynx one of the most effective remedies is the B.P. lozenge of krameria and cocaine.

In organic diseases of the brain, such as encephalitis or meningitis, insomnia may be very intractable. When severe a subcutaneous injection of hyoscine hydrobromide is often the most reliable remedy. To an adult 1/100 of a grain should be given in the first instance, and this dose may have to be repeated in an hour's time. When drugs can still be taken by the mouth a large dose, 30 grains, of sulphonal may be effective. Sometimes a subcutaneous injection of ½ a grain of sodium luminal will alleviate the restlessness and insomnia in patients suffering from organic brain disease. Occasionally a hot wet pack will succeed when hypnotic drugs have had little effect.

A brief reference may be made to certain minor physical causes of insomnia such as the excessive consumption of tea, coffee or tobacco. Others are flatulent distension of the stomach or intestines which can often be relieved by the taking at bedtime of ½ a tumblerful of hot water with 10 or 15 grains of sodium bicarbonate. Occasionally chronic constipation appears to be the cause, and if this be not relieved by other means can sometimes be advantageously treated by an enema given about an hour before bedtime. Other minor, but not uncommon, causes are cold feet in bed or insufficient mental relaxation before retiring for the night. A hot bath at night is in such cases often of great assistance.

In the great majority of cases, however, in which our advice is sought, we shall be unable to discover any physical cause for the insomnia. The general management of these cases must include a painstaking attempt to discover the mental or emotional stresses which may be responsible for the loss of sleep as well as a careful ordering of the patient's life and a rational use of hypnotic drugs.

In some cases, and generally when the insomnia is only of recent origin, it will be a comparatively simple matter to find an adequate cause in the course of an ordinary taking of the patient's history. In others, however, much more prolonged investigation may be needed, sometimes even a real " psycho-analysis." In insomnia of very long standing the habit of wakefulness has become so ingrained that nothing but the immediate use of hypnotics is likely to be of any value, at least for a considerable time. Even when it is impossible to remove the anxiety responsible for insomnia the patients should be reassured about the common fears that the mere loss of sleep will of itself do them great harm. The general hygiene and habits of the individual must be studied. Daily exercise in the open air is to be encouraged, while actual physical fatigue should be avoided. Over-indulgence in tea, coffee, tobacco or alcohol are all common faults which must be remedied. All patients with insomnia, except of the slightest degree, are much better sleeping alone.

For sedentary workers and those who have acquired insomnia after a bout of unusually concentrated or prolonged mental work a short holiday in the country is often the most successful remedy, although this may need to be supplemented at first by the prescription of some mild hypnotic.

The great majority of the patients who seek advice for insomnia alone and in whom no definite physical cause appears to be operative have generally suffered for a long time before medical help is sought. Immediate relief is much to be desired, and for this reason some form of hypnotic drug is nearly always required. The prescription of hypnotics should always go hand in hand with the other measures already indicated, but it is both wrong and unkind to withhold them because the real cause of the insomnia has not been determined. In prescribing hypnotics the simplest and least depressant remedy compatible with success should always be chosen. In persons of temperate habits alcohol has certainly some hypnotic effect, but its habitual use for this purpose is entirely unjustified. Occasionally, however, in mild cases of insomnia a glass of stout or a small quantity of whisky, preferably taken with the evening meal, may be sufficient to induce a satisfactory sleep. Alcohol should never be recommended to neurotic patients or to sufferers from any form of anxiety neurosis. It should be a golden rule to give in the first instance a dose of the hypnotic large enough to ensure a good sleep. The dose can easily be reduced later and the drug should always be stopped as soon as possible. The time of administration will naturally vary with the drug employed and the habits of the patient, but as a general rule hypnotics are best given just before bedtime. If possible the patient should not be told the nature or dose of the drug prescribed. Hence a soluble drug which can be prescribed in a mixture is generally preferable to a tablet or a powder. With a mixture also the dose can easily be diminished without the patient's knowledge by merely making up the quantity to the same volume with water. Once several good nights' rest have been obtained the patient may be allowed to leave the draught by his bedside with instructions to take it if he fails to secure sleep or if he wakes abnormally early. When patients are being treated at home without a nurse or some responsible relative in attendance, prescriptions for hypnotics should state the number of doses to be made up and should also be marked "Not to be repeated."

It will be of some service, perhaps, to consider briefly the types of hypnotics in common use and to note their particular characters and methods of employment. *Bromides* may be regarded as general sedatives rather than actual hypnotics, but they are often sufficient in slight cases. Even for this purpose they may be given with advantage in divided doses throughout the day, or they may be prescribed in a single large dose, e.g. 20 to 30 grains at night.. *Chloral hydrate* is an old-fashioned hypnotic which is probably too little used nowadays. It is one particularly suitable for occasional use and in early cases, and its supposed dangers are, in the writer's opinion, much exaggerated. It acts rapidly, producing generally a quiet and prolonged sleep. It is best given in solution in a dose of 10 to 20 grains, and may often conveniently be combined with one of the bromides. Its alleged evil effects are seldom seen, and the writer knew well a patient who took 20 grains of chloral practically every night for ten years without any bad effects. *Chloralamide* is less effective, but quite harmless, and can generally be given without hesitation to old and debilitated patients and in cases of severe cardiac disease. The dose is larger, 20 to 40 grains, it is relatively insoluble, and does not act so quickly as chloral hydrate. When a rapid effect is desired, it is best to give it with a little alcohol, e.g. ½ an ounce of brandy or whisky. *Paraldehyde* is a safe and valuable hypnotic, although its advantages are seriously diminished by its nauseous smell and taste and by its excretion by the bronchial mucous membrane. Addiction to this drug, though rare, certainly occurs. The effective dose in adults is from 1 to 2 or even 3 drachms. Its action is rapid and without dangerous effects on the heart or respiratory system except in cases of severe bronchitis. Its unpleasant characters render it unsuitable for any but occasional use, and especially in insomnia due to physical disease. It should be well diluted with water or flavoured with liquorice or tincture of orange, but it is very difficult to disguise its taste, and on this account capsules containing ½ a drachm may be preferred.

The hypnotics of the sulphone group, *sulphonal, trional* and *tetronal,* have lost much of their popularity since the introduction of the barbitone compounds. Sulphonal is now used mainly in the treatment of insomnia in the insane, but it is still a useful drug. Its drawbacks are insolubility, slow action and prolonged excretion. Several hours may elapse before its effect is seen, while an undesirable drowsiness may persist for a long time after the patient has awakened. The dose is from 20 to 40 grains, the latter being regarded as the maximum, suitable only for very excited patients. It may be given as a powder or suspended in milk, and owing to its slow action should be taken three or four hours before bedtime. It is not suitable for prolonged administration, since very undesirable and sometimes dangerous cumulative effects may be produced. The first indication of quite serious poisonous results may be the rare, but well known, cherry-red coloration of the urine, due to the presence of a substance resembling hæmatoporphyrin. This sign should be taken as a danger signal and the drug stopped at once. Trional is free from these drawbacks, but is uncertain in its effects. Being more soluble, it can be given in solution in a dose of from 10 to 30 grains at bedtime.

Probably the most widely used group of hypnotics at the present time are those of the barbituric acid group. These comprise *veronal* or *barbitone*, *sodium veronal* or *medinal*, *luminal* and *sodium luminal*, *dial*, *adalin* and *bromural*. Regarded simply as hypnotics they are undoubtedly effective, for they are characterized as a whole by rapidity of action and freedom from unpleasant after-effects. Against them it is urged that they produce, when repeatedly used, definite poisonous effects, that they lead to addiction, and that they are often employed for suicidal purposes. Their poisonous properties are not often seen unless they are taken in excessive doses or their administration be unduly prolonged. Addiction to them does occur, with the production of a state of chronic poisoning shown by various nervous symptoms, such as nystagmus, ataxia, defective articulation, tremors, and eventually in some cases a serious degeneration of the moral character. In general they may be regarded as not only harmless, but exceedingly valuable for occasional use, but great caution should be exercised before allowing them to be taken for any long periods of time. When it is necessary to give them for more than a few days at a time, every effort should be made to keep the patient in ignorance of the exact preparation and dose employed;

prescriptions should therefore be marked "Not to be repeated." Caution is advised before using these compounds in cases of advanced cardiac disease or in patients with respiratory difficulties from such conditions as broncho-pneumonia.

Of all these compounds veronal itself is probably the most effective and the most risky. It is relatively insoluble, and is best given suspended in a little warm milk at bedtime. The official dose is 5 to 10 grains, but, in the opinion of the writer, it is seldom advisable to exceed a dose of 7 grains. Medinal or sodium veronal is certainly less toxic, is much more soluble and, therefore, more suitable for general use. The dose is from 5 to 10 grains; an average dose to begin with is 7 grains. In obstinate cases of insomnia 15 grains can be given with perfect safety. Indeed, it is nearly always a perfectly safe drug unless its administration be very prolonged, when it is capable of producing well-marked poisonous effects. Other preparations of the barbitone group are luminal, sodium luminal, adalin, bromural and soneryl. While luminal finds its principal use in the treatment of epilepsy it can be employed as a hypnotic in the milder forms of insomnia. For this purpose 1½ or at most 2 grains should be prescribed. Sodium luminal is more soluble and can, therefore, be given in solution; solutions, however, are unstable and must be freshly prepared. Bromural grs. 5 to 10, adalin grs. 5 to 10, and soneryl grs. 1 to 2 are all useful in slighter cases.

It is impossible within the limits of a short article to consider the large number of proprietary hypnotic drugs which are constantly being placed upon the market. Nor is it desirable for the practitioner to prescribe new remedies with whose action he is unfamiliar. It is far better that he should acquaint himself thoroughly with the appropriate doses and peculiarities of a few reliable hypnotics. Amongst the barbituric acid derivatives the writer has found medinal to be one of the most reliable.

Other measures besides the general hygiene and the administration of hypnotics may be required in the more obstinate cases. General massage given with the patient in bed is sometimes of value. Hypnotic suggestion is always worth a trial and should be quite free from any harmful effects.

The treatment of insomnia in the psychoses may present great difficulties, since the continued administration of large doses of hypnotics is very undesirable. Hydrotherapy is sometimes successful when drugs fail; a hot wet pack may be given, and in the case of robust patients suffering from great excitement a cold pack. Among the hypnotics the bromides, chloral hydrate, medinal and paraldehyde afford a choice from which a successful remedy may be found for the milder cases. The general restlessness of many manic-depressive patients may sometimes be relieved by small doses of one of the barbitone derivatives given in divided doses throughout the day, e.g. medinal grs. 2 to 3, thrice daily. Sulphonal is valuable in excited patients, but may have to be given in large doses, up to 30 or even 40 grains. As already mentioned it should not be continued for long on account of its poisonous cumulative properties. In elderly and enfeebled patients with arteriopathic dementia we must be careful to avoid depressant remedies. In such cases paraldehyde is usually safe and a mixture of the bromides and choralamide given with a little alcohol will often be found effective.

No apology should be necessary for the space devoted in this article to the use of hypnotics. To attempt to treat insomnia without drugs is an ideal seldom to be attained. The temporary success which they confer, however, must never lead to neglect a painstaking search for the causes of the insomnia and a wholehearted attempt to correct them by more natural methods.

Minor Mental Disorders

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THE term minor mental disorders is here used to describe mental disturbances found in individuals who will never need or do not yet need treatment in a mental hospital. As a rule neurotic and hysterical individuals never require certification; there are other mental disorders in which no hard and fast line can be drawn between those within and those outside the mental hospital. Minor mental disorders thus include neuroses and the mild forms and early stages of psychoses.

The anxiety reaction.—Anxiety may be defined as the association of fear with uncertainty. It is thus a little different from simple fear. For example, fear is the mental state evoked by being pursued by an escaped lion; anxiety is the emotion with which one anticipates the possibility that an escaped lion may be waiting round the corner. Pathological anxiety may be defined as anxiety for which no normal cause is apparent to consciousness. Anxiety may play a part in frankly psychotic states, for example, agitated depression. We will confine our attention, however, to neurotic anxiety, the state of mind of those anxious individuals who cannot explain the cause of their fear, but who are otherwise mentally normal. I need only mention in passing the familiar physical symptoms of anxiety. In well-marked cases the pupils are dilated, the tongue dry, the pulse rapid, the hands cold and tremulous, the tendon reflexes exaggerated. The victim finds concentration impossible, and sleep, which is uncertain, is apt to be disturbed by terrifying dreams.

It is important to recognize that, as no mental state is uncaused, there is always a cause for neurotic anxiety and the patient is often indirectly aware of the cause; that is, he is aware of the source of his fear, though he does not recognize that it is the source. It is convenient to divide patients with neurotic anxiety into two groups: (1) those suffering from focal anxiety, and (2) the constitutionally anxious. The focal causes of neurotic anxiety are exactly the same things which might justifiably cause some anxiety in normal individuals. Fear is intimately related to the instinct of self-preservation, but the "self" has several meanings. At the lowest level it is the bodily self, which is threatened by disease, pain and death. But man needs many accessories if he is to live and provide for his family in comfort; hence he possesses an economic self, which is liable to be threatened by financial and occupational anxiety. Further, from his earliest days he sees himself reflected in the opinion of others and compares himself with the standards offered by religion and morality. Here is his highest self, subject to the threats of social inadequacy, public disfavour and the sense of guilt. An anxiety reaction may develop out of a threat, real or imaginary, directed against either the bodily, the economic or the social self. Thus the source of the anxiety symptoms may be a fear of disease. Common examples of this are the fears of ill-health or mental breakdown resulting from masturbation; the fear of appendicitis and heart disease in the young adult; the fear of cancer and high blood-pressure in the middle-aged and elderly. Economic anxiety is at the root of traumatic neurasthenia and compensation neurosis. Marriage is perhaps the most difficult of social relationships, and the sexual life is a potent source of anxiety based upon a sense of inadequacy or of moral guilt.

Among those I have called the constitutionally anxious, it is not the threat which is serious, but the self which is vulnerable. Here we are dealing with individuals who from various causes, dating usually from childhood, have grown up with a sense of inadequacy or inferiority which is apt to tinge with anxiety all their relations with their fellow-men. Even so, their ultimate breakdown often occurs as the result of some specific focal anxiety.

It has been well said that in looking for the cause of anxiety we should ask, not what happened in childhood, but what happened last year; and when we have to deal with a patient suffering from anxiety of recent onset a rapid investigation of the probable causes will often bring the source to light. When this is a fear of disease, especially when the fear is unfounded, the practitioner can do much to remove it by a thorough examination and reassurance. Other sources of anxiety may be less easily removed, but even if the cause cannot be removed the patient's attitude of mind may be altered, and anxiety can often be suppressed by a genuine attempt to deal adequately with a difficult situation. Profound psychological analysis is unnecessary in the majority of patients suffering from anxiety reactions. It may, however, be needed in the case of the constitutionally anxious who suffer from unsatisfactory mental habits of long standing, though some of these, to derive any benefit, "would require," in Osler's phrase, "to be analysed back to the original blastoderm."

The hysterical reaction.—A hysterical symptom is at the same time: (1) a product of suggestion, (2) the expression of an idea in the patient's mind, and (3) a means to achieve a purpose. The suggestion may be derived from actual organic disease, e.g. laryngitis may suggest hysterical aphonia. It may be the result of an injudicious remark by a friend or practitioner, or the symptom may be suggested by a similar symptom in another patient. As a result of suggestion the patient acquires the idea that she has lost her voice or has a paralysed arm. The symptom thus corresponds to an idea, and this enables us to differentiate the hysterical symptom from a symptom due to an organic lesion, since the patient's idea of, let us say, paralysis does not coincide with the symptoms of a lesion of any part of the nervous system. The most important point about the hysterical symptom from the standpoint of treatment is its purposive character. For example, a daughter gives up her work against her will to look after an invalid mother. She then develops hysterical paralysis of the right arm. This prevents her from doing anything for her mother, and assistance has to be obtained to look after the two invalids. This patient is the victim of conflicting impulses. She wants to be at work, but she feels she owes a duty to her mother. Her paralysis saves her from an unpleasant duty, at the same time preserving her self-respect, for who can blame her for being ill? She solves her conflict, but at the expense of a hysterical symptom. Incidentally, she satisfies a prominent need of the hysterical temperament, the craving for sympathy. The conflict which is solved by a hysterical symptom is usually a moral conflict.

It follows that all attempts to deal with a hysterical symptom as a symptom are likely to fail, or if successful to be followed by relapse or by the appearance of another symptom. To remove the cause it is necessary to find out what difficulty has precipitated the illness. Since many of these difficulties are domestic, the general practitioner has opportunities of discovering them which are denied to the consultant and the out-patient medical officer. When the cause has been found the patient must be induced to deal with the difficulty without resorting to neurosis. When this stage has been reached, suggestion, persuasion and physico-therapeutic measures can be brought to bear upon the symptom with more hope of success. Why does the hysteric react to her troubles in this peculiar way? To explain this we seem driven to postulate a definite psycho-physiological predisposition. Even if we cure an attack of hysteria the predisposition remains and many, though not all, of these patients remain fundamentally abnormal and liable to relapse.

Depression.—Depression is a symptom which differs fundamentally from anxiety in causation, prognosis and treatment. Most depressed patients are suffering from the condition which used to be known as manic-depressive psychosis and is now often called cyclothymia. Patients who conform to the textbook description of an individual alternating between depression and maniacal excitement are rare. In many cases excitement is absent; in others it is so slight that it is only detected by special inquiry. Depression is a mental state *sui generis*, which cannot be described in terms of anything else. Usually no cause for it can be discovered. As a rule it is associated with mental retardation. In milder cases this may be apparent only to the patient, who says, " My mind seems numb," or " My brain won't work." Insomnia and anorexia are usually present and there is generally some loss of weight.

Although the patient may be seen in his first attack, periodicity is a striking feature of the depressive state. There is often a history of one or more previous attacks of depression, which may have occurred years previously, which lasted a few weeks or months and passed away leaving no sequel. Although phases of marked excitability are uncommon in these milder cases, yet there is often a hint of them in the statement that the patient when well is " very lively " or " the life and soul of the party." The family history is often an aid to diagnosis, since cyclothymia is strongly hereditary and one often finds that other members of the family, perhaps in previous generations, have suffered from a mental illness severe enough to necessitate certification. Sufferers are usually of the short, broad, thick-set type. Depression being essentially cyclical tends to disappear spontaneously in time, though there is always a risk of a further attack at some future date. The prognosis is worst at the menopause and in later life, but even then many patients recover. The great risk is suicide, and a large majority of individuals who commit suicide when suffering from " neurasthenia " are really victims of psychotic depression. It is usually wise to discuss this risk frankly with the patient, who will often welcome the opportunity of expressing his own fears of self-injury.

Treatment is directed to preventing suicide and promoting rest and sleep, for which purpose luminal is a valuable drug. Admission to a mental hospital is desirable only when the risk of suicide cannot be averted in any other way, or when the patient becomes so ill that special methods of feeding and nursing have to be adopted. Active psychotherapy is of little value, but understanding, reassurance and sympathy are helpful.

Hypomania.—Mania is the opposite mental state to depression, with which it may alternate, as in the typical cyclical cases of manic-depressive psychosis. Instead of being depressed the maniacal patient is elated, and instead of exhibiting mental retardation he is facile and energetic and exhibits a rapidity of mental association which has received the name of " flight of ideas." We are not now concerned with severe cases of mania, but with milder degrees of the same disorder which may persist for weeks, months or years—chronic hypomania.

The most striking feature about the hypomanic patient is usually his extreme energy. He sleeps little, rises early before anyone else in the household is up and retires to bed late. If he is at work he lives in a positive fever of activity. He is voluble, genial and sociable. He is apt to appear to better advantage among strangers than at home, where he is usually irritable and gives way to fits of rage if he cannot get his own way. One such patient used to throw the dinner at the ceiling if it was not cooked to his liking.

Another had his house full of loud-speakers which he kept going all day and most of the night, so that it was known in the locality as 2LO. The hypomanic is extravagant, careless of money, but often generous. One patient used to give dinner parties at a restaurant and invite anyone within sight to join him. Alcoholic excess is common. In spite of his mental disorder, the hypomanic does not develop dementia.

There is little difficulty as a rule in making a diagnosis of this flamboyant psychosis, though, in its mildest degrees, it fades into the mental state of the voluble, energetic and enthusiastic cycloid normal individual. Treatment is difficult, and the milder cases are not certifiable. One should try to give the patient some insight into his condition and educate him in self-control. Sedative drugs, if he can be induced to take them, are of some value. There is always a risk that the hypomanic patient may develop acute mania.

Schizophrenia.—Schizophrenia is more familiar to many under its old name of dementia præcox, which is now little used. As someone remarked, this was a bad description of a disease which was neither dementia nor præcox. Moreover, the old name was associated with a uniformly bad prognostic outlook which is now known to be quite unjustified. Many schizophrenic patients get well, and many of the milder forms of schizophrenic breakdown are probably never recognized.

Schizophrenia most commonly occurs in adolescents and young adults, but may be met with at any age after childhood. Probably, it is no more a disease than epilepsy, but is a psychotic reaction of a certain pattern. The essence of schizophrenia is difficult to define, and there has been much discussion about it. It is fundamentally a disorder in the realm of feeling and interest. Normal individuals react to life by emotions which, though subject to wide variations, conform to certain standards. The schizophrenic patient is no longer in normal emotional touch with reality. This has several consequences. His emotional responses to external situations are abnormal. He receives bad news with a smile. As his interest in the outside world fails, he retreats into an inner life, and his own mental processes acquire for him an objective reality. Hence arise all forms of delusions and hallucinations. His emotions are dictated by the events of his private world. Consequently, his impulsive acts, his outbursts of excitement, his smiles and his resistiveness are meaningless to the outside observer. Though he lives a dream life, the schizophrenic's intelligence is often little affected. He may be quite well orientated, recognize his friends and be aware that he is in a mental hospital. The classical example of schizophrenia is to be found in Shakespeare, who gave recognizable portraits of most psychotic types centuries before they were classified by psychiatrists. Ophelia's madness was precipitated by her father's death and by Hamlet's rejection of her love. Schizophrenic speech, mannerisms and hallucinations are all attributed to Ophelia :

> " Her speech is nothing,
> Yet the unshaped use of it doth move
> The hearers to collection ; they aim at it,
> And botch the words up fit to their own thoughts ;
> Which, as her winks and nods and gestures yield them,
> Indeed would make one think there might be thought,
> Though nothing sure, yet much unhappily."

Why does schizophrenia develop ? The etiology of the condition is at present obscure. Kretschmer has pointed out that it is usually associated with a certain physical type which he calls the leptosomatic. Physically these patients are slender, with small bones, long, narrow hands and tapering fingers. They often appear several years younger than their true age. Hereditary predisposition plays a part in some cases, but is often absent. No definite organic basis for the disorder has been discovered. It is important to recognize the rôle of stresses, both physical and psychical, in etiology. In the worst cases, the disorder seems truly endogenous in that no cause for the breakdown can be discovered. Other schizophrenics collapse mentally in the face of comparatively mild difficulties, often connected with their occupations. In the third group an external cause is more obvious. An illness, pregnancy and the puerperium, or an unhappy love affair prove the precipitating factors. This point is of importance, for the more difficult it is to find an external cause for the breakdown the worse are the prospects of recovery. The more adequate the external cause, the better the outlook.

Although schizophrenia may not become fully apparent until perhaps the third decade of life, on looking back over the patient's history one often finds hints that his personality was abnormal at an early age. He has been shy and seclusive, and if not intellectually backward, emotionally immature. The father of one of my patients said of him : " We always used to call him ' Peter Pan.' " Occasionally, however, the child is for a time clever and successful beyond the average. When the breakdown comes it may take various forms and may develop insidiously or with startling suddenness. It is with the insidious cases that we are most concerned.

Usually the patient becomes quieter than normal. He refuses to go out and sits at home doing nothing. He develops odd habits. He smiles for no apparent reason and, when asked what he is smiling at, says, " Nothing." He may develop an interest in metaphysics or theosophy. All these slight changes give little indication of the upheaval beneath the surface, until suddenly he gives utterance to some bizarre delusion or carries out some abnormal action, which reveals even to his relations the true state of affairs.

To detect the early stages of schizophrenia, then, we should obtain a careful history of the patient's mental development. We should look especially for alterations in temperament and for sudden impulsive changes of occupation, and should lay stress upon subjective disorders of feeling and mood. A loss of interest in life, a loss of normal affections, a feeling of emotional deadness or of the unreality of the external world are all significant symptoms, and we should look for mannerisms, little actions which are apparently meaningless, but which spring from the disordered mental life. The schizophrenic smile, once recognized, is unmistakable.

What treatment should we adopt for schizophrenia, and what are its prospects of success? When the breakdown appears to be purely endogenous less can be expected of treatment than when there is some definite external stress with which to deal. It is important to remove the patient from the surroundings in which the breakdown has occurred or is threatened. This does not necessarily mean sending him to a mental hospital, though this will be required in severe cases. Milder cases can be nursed satisfactorily at a nursing home, provided adequate skilled mental nursing is available. Isolation from relations and friends is essential. Sedatives are necessary in most cases and adequate sleep must be ensured. Luminal and medinal are the most useful drugs for this purpose. The nutrition of the patient must be maintained and an adequate supply of vitamins must be arranged. Psychotherapy in my experience has a definite, though limited, value in some cases. Where the cause of the breakdown is an obvious maladjustment, this can be explained to the patient when he begins to recover, and he can be helped to adjust himself to life more satisfactorily. Treated along these lines not a few patients will make satisfactory recoveries and return to play their part in social life, though they will always be liable to a similar breakdown at a later date, if life once again proves too difficult for them.

Hypertension

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IT is nowadays common knowledge that sphygmomanometry constitutes a first-class essential in the investigation of circulatory disorders and that, in conjunction with careful clinical examination, it affords complementary knowledge of the greatest possible value. The correct interpretation and assessment of blood-pressure records are by no means simple, chiefly because of the widely varying range which normally obtains in healthy people, but, assuming that this latter fact is duly appreciated, we can more reasonably approach the question and significance of abnormalities. This article is concerned with the supernormal types of blood-pressure derangement, and these can, without hesitation, be regarded as widely prevalent in all classes of the community.

In the vast majority of cases hypertension is a disorder of adult life, and for practical purposes may be defined as the condition in which the blood-pressure figures separately or in combination exceed 160 mm. systolic and 100 mm. diastolic. It is convenient to postulate the so-called hypertensive state on this basis and, inasmuch as its etiology varies considerably, also its significance, special inquiry and discrimination will be required in all cases following recognition of the disorder.

There is good reason to suppose that hypertension may arise as the outcome of arterio-capillary fibrosis, possibly commencing in early life, in which the renal vessels are especially affected. This theory was originally propounded by Gull and Sutton in 1872, and there appears to be no reasonable doubt that it is the correct solution of the problem in a certain proportion of the cases; as might be expected, moreover, there are very probably a large number of different causes underlying primary vascular disease, such as syphilis, alcohol, the endotoxæmia of gout and constitutional discrepancies, and all the available evidence, both clinical and experimental, suggests that the process may originate in the small vessels of the kidneys; hence the conception of the so-called vascular granular kidney referred to by Volhard as benign hypertonic renal sclerosis in which the degenerative changes commence in the vessels and preponderate for a time over those in the renal parenchyma; hypertension is in these circumstances a secondary manifestation, the sequel to primary vascular disease. It is, however, suggested that this sequence of events may be entirely reversed and that high blood-pressure may be itself the determining factor of subsequent disease in the vessels; this theory would appear to explain more particularly the clinical phases characteristic of infective kidney disease and the circulatory and vascular disabilities with which it is associated. But allowing for a relatively high incidence of chronic nephritis in hypertension cases, and remembering that such a combination is invariably one of extreme severity, there remain for consideration other groups of cases in which there is no suspicion early or late of impairment in the renal function. Of these latter three may be mentioned: a nervous group, a toxic group, and a group in which derangement of the endocrine glands constitutes the underlying factor. In those cases of so-called nervous origin we assume autonomic imbalance in the shape of exaggerated vasomotor tonicity which, resulting from such states as worry, anxiety, emotional strain, and prolonged mental concentration initiate a functional rise of blood-pressure and subsequently a vascular sclerosis secondary thereto.

The second group refers to disorders in which there is an underlying toxæmia of either chemical or bacterial origin; the better known of these include gout and the errors of metabolism secondary to over-alimentation, over-smoking and the excessive use of alcohol, also intestinal toxæmia and the various forms of focal sepsis.

The third group is exemplified by the hypertensive tendencies so frequent in women at or about the menopause, which may be assumed to be the outcome of an endocrine disturbance; incidentally it may be remarked that, though a temporary event in a certain proportion, the majority of these cases of menopausal high pressure are refractory to treatment and symptomatically progressive.

Apart, however, from the above groups of known etiological factors there are a considerable number of cases without any tangible explanation of the high-pressure syndrome, either in the shape of hereditary or acquired disease; in other words a wide and unexplored field still remains for solution, and extensive research will obviously be required before anything approaching a comprehensive conception of the high-pressure state can be promulgated.

The symptomatology of hypertension.—Clinical evidence of the high blood-pressure syndrome is, as a rule, a subject of some complexity, for in the majority of cases the condition is merely one of the features of an underlying morbid process, the symptoms of which must invariably mingle with those for which the raised pressure is responsible. It therefore follows that patients' histories must be examined with considerable caution in order to differentiate and assess those specific phenomena which are definitely attributable to hypertension *per se* and the disordered circulatory mechanism which develops in its wake. For descriptive purposes it is convenient to separate the symptoms of raised pressure into two groups according to whether or not there may be evidence of a co-existing myocardial failure, and it is well to remember that the latter is by no means an essential complication, a large percentage of cases showing no manifestations of its presence during the whole course of their malady.

The symptomatology of high blood-pressure without cardiac failure can be expressed quite briefly in terms of cardiac over-action combined with an excessively vigorous circulation through the viscera. As a general rule patients complain of breathlessness, palpitations, flushings, throbbing sensations and varying degrees of discomfort in the chest, possibly even attacks of pain which are characteristically anginal in type; in an unselected series of cases 28 per cent. of the patients complained of substernal effort pain as their most prominent symptom, and several of the remainder suffered from typical angina intercurrently with other discomforts of a more urgent character.

Foremost among the latter occurred the so-called cerebral symptoms, a varied group of subjective disorders all indicative of disordered circulatory mechanism in the central nervous system; certain of these are the obvious equivalents of surcharged vascular channels, the more usual including giddiness, headache, sensations of fullness and throbbing in the head, tinnitus, insomnia, irritability, and emotional tendencies; added to these, moreover, are a series of symptoms which signify depression of nervous function and control; we may expect the latter in the fully developed and later stages of all the hypertension cases, the typical signs being lassitude, exhaustion, physical weakness, disinclination for exercise, fainting attacks, defective concentrating powers and a progressively failing memory; varying combinations of all these so-called cerebral symptoms are possible, and their relative significance cannot be assessed too carefully as furnishing valuable data in regard to prognosis and the effects of treatment; the former will, to some extent, depend upon the actual grade and general progress of the existing symptoms which may be singularly persistent in the more severe cases or sufficiently intensified to suggest the threatened advent of a vascular accident, either spastic, thrombotic, or apoplectic in type.

Of other principal symptoms in high tension cases the visceral crises deserve special mention, it not infrequently happening that patients experience recurring paroxysms of abdominal colic associated with uncontrolled vomiting; such attacks may last for hours or days at a time and, quite apart from the actual distress for which they are themselves responsible, it more often than not happens that other co-existing symptoms, especially headache, palpitation and præcordial pain, are synchronously intensified, thereby exaggerating the degree of physical prostration. As in the somewhat similar crises of tabes dorsalis, recovery is complete between the attacks and, beyond bearing it in mind, the question of uræmia need not arise unless there is confirmatory evidence of kidney disease, e.g. albuminuria, cylinduria, raised blood-urea, deficient urea-concentration or retinitis, together with some such subjective symptoms as drowsiness, cramps, convulsions, coma, air hunger or paroxysmal dyspnœa.

The next consideration is in reference to the symptomatology of high blood-pressure with cardiac failure; the latter is at all times a possible complication, more often than not it is an obvious factor and, in a large proportion of the cases, it is the immediate cause of a fatal issue. Although, moreover, the full development of cardiac failure presents no difficulty, one cannot be by any means so equally confident in regard to its earlier phases; the symptoms already existing will for a variable length of time entirely mask those for which the developing circulatory incompetence is itself responsible; in spite, however, of its vague and insidious onset there will sooner or later be suspicions, both subjective and objective, of deficiency of the cardiac reserve. A constant and significant sign of the latter is breathlessness, and this patients regard as a somewhat disturbing feature of the condition because their exercise tolerance is materially prejudiced thereby. Other complaints include palpitation, irregular heart action, discomfort in the chest, transient attacks of severe pain, varying degrees of mental and physical depression, and persistent tiredness, each and any of which, though possibly antedating the heart-failure stage, becomes thereafter a definite and more prominent feature of the disability. Further evidence is usually forthcoming on clinical examination; the pulse-rate tends to be accelerated and irregularities in the shape of premature contractions are frequent; the apex impulse, previously punctate, shows signs of diffusion; the first heart-sound is prolonged and relatively less distinct than it was formerly; the venous circuit begins to stagnate as evidenced by undue fullness of the jugular vessels and suggestions of cyanosis. The electrocardiogram incidentally may in certain cases be distinctly helpful especially if previous records are available, abnormalities such as flattening of the T waves, slurring or splintering of the RS complexes and conduction defects being especially significant of impaired myocardial function.

The later progress of hypertensive heart disease can be best described under two main headings: (1) the congestive and (2) the anginal type of failure; these conditions, moreover, are not only opposed the one to the other, but entirely dissimilar except in so far as both tend to accelerate a fatal termination.

The term congestive failure denotes a syndrome of circulatory incompetence characterized by venous stasis, increased capillary pressure, and slowing of the peripheral blood-stream; it is obvious that these discrepancies must have far-reaching effects, and that signs and symptoms will be forthcoming by reason of the mechanical derangements in the circulation and, incidentally, also the impaired functional efficiency of the various organs. The clinical picture of congestive heart failure in its fully declared form is one, therefore, of an extensive process involving numerous and varied manifestations in addition to those that are more strictly cardiac in type; the latter are often, in fact, singularly negative, but in a certain proportion of the cases there are noteworthy abnormalities, as for instance, a persistently fast heart action, impairment in the quality of the first heart sound, gallop rhythm, a drop in the blood pressure, and a diminished range of pulse pressure, each of which may be regarded as a valuable sign confirmatory of myocardial insufficiency; otherwise the large majority of symptoms and the outstanding clinical features of cardiac failure include a somewhat complex group of peripheral and visceral manifestations, all of which depend pathologically on the widespread venous stasis and the co-existing tendency to tissue œdema; beyond emphasizing, however, a potential involvement of all the various organs and systems it is unnecessary in the present context to detail the numerous phenomena which characterize their implication and consequent disfunction.

Hypertensive heart failure may, however, run its entire course without any evidence of venous congestion or anasarca, and in these cases the prominent factor is pain frequently associated with an increasing degree of oppression in the chest and breathlessness which varies in grade proportionately with the reserve efficiency of the myocardium. The pain incidentally, though conforming to the typical anginal syndrome, may be somewhat peculiar in hypertension cases; very frequently its onset is spontaneous and unexplained, the patient either resting or possibly sleeping at the time of the seizure; in the majority of cases its area of distribution is extensive, involving the retro-sternal region and præcordium with radiation to the neck, and possibly to both arms; the attacks may persist for hours at a time, and are often associated with palpitation, paroxysmal breathlessness, and possibly pulmonary œdema; though the acute pain may be completely relieved by treatment cutaneous hyperæsthesia may subsequently persist for varying periods of time (hours or days), especially following the more protracted seizures. As in the congestive so in the anginal group of hypertensive failure, examination of the cardiovascular system may be singularly negative except, of course, for the well-established signs of raised pressure, e.g. the forceful apex impulse, hypertrophy of the left ventricle, prolongation of the first heart sound, accentuation of the second sound at the aortic region.

There are certain additional physical signs which characterize anginal failure, cases sufficiently often to warrant special mention: (1) Gallop rhythm—a particularly grave phenomenon which, having been definitely established, usually tends to persist. (2) Pulsus alternans—also a sign of serious moment recognizable at times by palpation of the radial pulse or preferably by auscultation over the brachial vessel during decompression of the sphygmomanometer from the level of maximum pressure. (3) A diminishing range of pulse pressure, the systolic level remaining stationary, or possibly rising slightly, the diastolic level also increasing but to a proportionately greater extent.

TREATMENT

In approaching the question of rational treatment for high blood-pressure the following preliminary considerations are essential: (1) That hypertension is itself only a symptom and that it occurs as such in large numbers of diseases of widely varying pathology. (2) That the rational treatment of hypertension phenomena should in all cases involve consideration and, if possible, a definite diagnosis of the underlying disease. (3) That in cases of doubtful etiology treatment cannot be other than palliative and symptomatic. (4) That in a certain proportion of cases hypertension is compensatory and essential, and that active treatment with a view to moderating the pressure under these circumstances is contra-indicated.

In support of clauses 1 and 2 certain diseases may be mentioned, e.g. nephritis, gout, hyperthyroidism, diabetes, focal sepsis and various types of heart disease; in any of these high blood-pressure may be a prominent factor, but as a general rule, other than appropriate treatment for the primary disease which need not be discussed in the present context, the high tension itself will not require separate consideration. The following remarks relate mainly to the management of those cases in which there is symptomatic evidence of raised pressure and insufficient proof as to its actual etiology.

Attention may first be directed to some general principles of importance. Inquiry into and adjustment of the daily routine, habits and occupation are essential, the object being to minimize as far as possible anything in the nature of strain, either physical or mental; according to the temperament, past history and domestic circumstances of the patient, also incidentally the urgency of the symptoms, it may be necessary to consider the prescription of complete or modified rest, possibly a change of environment or occupation, and such suitable restrictions as the patient's previous history may render desirable; a large number of cases, more especially those in whom mental strain and over-concentration are obvious factors, will be well advised to make definite rearrangements in their general manner of living so that their business engagements, rest periods and exercise shall be sensibly and efficiently balanced; the quieter hobbies and such outdoor exercise and games as may be within the limits of the tolerance should be encouraged, and all patients must learn and appreciate the art of relaxation in its fullest sense.

The diet question in high blood-pressure cases always calls for special consideration; as a general rule an ordinary mixed diet is permissible and, except in cases who show definite evidence of nitrogen retention, there is no particular point in limiting the protein intake; in certain types of patient with obesity tendencies it will obviously be necessary to impose restrictions in regard to the various forms of fat-producing foods, e.g. fats as such, carbohydrates, and at the same time to forbid all forms of alcohol and dietetic excesses generally; occasional starvation days may be prescribed with advantage, also thyroid medication, the latter in gradually increasing doses combined with pituitrin. It may further be considered whether or not a course of spa treatment may relieve the symptoms and improve the outlook of high-pressure patients with complicating obesity, except in the very debilitated and complicated cases; also in the obvious presence of advanced cardiac or renal disease, a carefully chosen cure may be distinctly beneficial; this form of treatment is based upon physiotherapy (massage, hydrotherapy, electrotherapy and graduated exercise) in combination with the internal administration of mildly purgative and diuretic waters, these latter promoting the processes of elimination and the former those of the circulatory mechanism.

A large and varied selection of medicinal remedies has been employed for the treatment of hypertension, but, with few exceptions, the theory of their efficiency has not materialized in practice and the actual list of reliable drugs is therefore extremely limited. Potassium iodide in increasing dosage and the various preparations of iodine may be found valuable in certain patients, more particularly those who have passed middle life. Bromides, chloral hydrate, luminal, theominal and other such-like sedatives may be used when the nervous factor is prominent, and some suitable preparation of valerian (perhaps with bromide) for the neurasthenic cases. Should hypothyroidism be obvious it may be well to prescribe a course of thyroid extract, and this also if obesity complicates the condition. For hypertension of the menopause the bromides appear to be distinctly valuable, and with them may be combined some one of the reliable calcium preparations, also tentatively a polyglandular or plain ovarian extract.

An efficient daily bowel action must be ensured in all cases of hypertension, and for this purpose it may be necessary to revise the diet so that it shall include the correct proportion of fatty foods, fruit, vegetables and fluids, otherwise it may be advisable to prescribe a reliable aperient water as Hunyadi Jànos, Friedrichshall, Kissingen, Rubinat, or laxative lithia, or, alternatively, some one of the vegetable laxatives as aloes, cascara sagrada, senna or rhubarb, and each of these may, if necessary, be supplemented by a daily dose of liquid paraffin; in addition, however, to the above, certain of the more actively depletive remedies, the cholagogue purgatives and the hydragogue cathartics, will, as a rule, be indicated in the majority of high tension cases; at intervals of about a week or a fortnight it may therefore be advisable for patients to take a mercurial pill at bedtime with a saline purge on the following morning.

In its later stages hypertension may be associated with cardiac failure either congestive or anginal in type; the former should be treated on orthodox lines by rest, and such therapy as the embarrassed circulation may warrant; this will include the prescription of diuretics, such as digitalis, diuretin, euphyllin, or salyrgan, suitable purgatives as blue pill, calomel or colocynth with hyocyamus and other depletive remedies as, for instance, leeching, venesection (with inhalations of oxygen if dyspnœa is especially prominent), acupuncture and paracentesis abdominis; when œdema is persistent it may be advisable to restrict the fluid intake to an amount not exceeding two pints during the twenty-four hours and to try the effect of a salt-free diet; in the majority of cases restlessness and insomnia are troublesome features; for such a warm drink or a stimulant narcotic (whisky or brandy) at bedtime may suffice, but these failing it will be necessary to administer some form of simple sedative, e.g. a bromide or chloral draught or chloralamide or medinal or paraldehyde or Dover's powder.

For the anginal type or high-tension failure potassium iodide (perhaps in combination with ammonium bromide) is found to be the most effective remedy, and it must as a rule be prescribed in large and gradually increasing dosage; the painful seizures may yield, and will usually be governed to some extent by the prescription of vascular relaxants (the nitrites, benzyl benzoate, erythrol tetranitrate) and diffusible stimulants as sal volatile or ether or brandy, but in obstinate cases it may be necessary to administer morphine and to apply counter irritants externally, or even to try the effect of a graduated course of diathermy. If, as frequently happens, the blood-pressure shows a tendency to rise during the failure stage a moderate venesection may be distinctly helpful, and this, with morphine, atropine or strophanthin, may prove to be a singularly successful remedy for the attacks of pulmonary œdema which may complicate the final stages of the malady.

The Significance of Albuminuria and the Treatment

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IN any attempt to assess the significance of albuminuria in a particular case all possible causes have to be taken into account, and it is convenient for this purpose to set out a classification of albuminuria* which will show its varied etiology at a glance. In this classification, after excluding accidental albuminuria, an anatomical basis is taken for the distinction of extra-renal and renal albuminuria, and also for the varieties of extra-renal albuminuria. The division of renal albuminuria into organic and functional groups is made on a pathological basis. Taken as a whole, the distinction between organic and functional groups is clear, but in an individual patient this is often difficult. Many cases, for instance, of functional albuminuria in new-born infants could as easily be placed in the groups "Toxæmic kidney," "Circulatory disturbance," "Fatigue and cold." The several varieties of organic albuminuria depend simply on the varieties of organic renal disease with all of which albuminuria is associated, if not throughout, at least at some time in their course. Functional albuminuria is divided up according to its causation.

CLASSIFICATION

ACCIDENTAL ALBUMINURIA.

TRUE ALBUMINURIA.

(1) *Extra-Renal Albuminuria,* including diseases of

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* The term albuminuria is used in this article as it is generally understood to include globulin and albumin, and to exclude Bence Jones' protein. It is used, in fact, in the sense of proteinuria.

the urethra, prostate, bladder, ureter, and renal pelvis.

(2) *Renal Albuminuria.*

(*A*) *Organic albuminuria,* including:—(1) toxæmic kidney; (2) Bright's disease; (3) residual albuminuria; (4) vascular disease, including arteriosclerotic kidney (hyperpiesia), senile kidney (senile arteriosclerosis), thrombosis and embolism; (5) surgical diseases of the kidney.

(*B*) *Functional albuminuria,* including:—(1) newborn infants; (2) adolescent; (3) lordotic, orthostatic, cyclic and intermittent; (4) circulatory disturbance; (5) fatigue, cold and over-eating.

ACCIDENTAL ALBUMINURIA

In any case of albuminuria of doubtful significance the first step is to exclude contamination of the urine with discharges from the vagina or prepuce, or with seminal secretion. In the male it is sufficient to collect a mid-stream specimen in a sterile vessel. In the female a catheter specimen is generally required, though in this case also a mid-stream specimen properly collected may be sufficient to exclude contamination. The routine clinical tests are better done by the practitioner than in a laboratory, especially if a microscope is available for examination of the deposit that settles from a specimen of fresh urine after standing for half-an-hour.

TRUE ALBUMINURIA

(1) *Extra-Renal Albuminuria.*—The extra-renal source of the albumin is often indicated by the patient's symptoms. It may be a urethral discharge or painful micturition which declares the presence of urethritis. Symptoms of obstruction may point to enlargement of the prostate; suprapubic pain and frequency of micturition, or other evidence of cystitis, may indicate the fact of disease of the urinary bladder. Frequency of micturition and pain in the back may suggest

pyelitis. The presence of organic disease may be declared by physical signs, such as enlargement of the kidney or its pelvis, dilatation and hypertrophy of the bladder, or enlargement of the prostate.

Instrumental methods of radiography are particularly useful in the diagnosis of extra-renal albuminuria. Disease of the urethra, bladder or ureters may often be diagnosed with certainty by urethroscopy and cystoscopy. The condition of either or both ureters and kidneys can be separately determined by ureteric catheterization. X-ray examination may show a calculus, tuberculous disease, calcification in a neoplasm, or abnormal position or size of one or both kidneys. More recently intravenous pyelography has proved a valuable additional aid to diagnosis.

In extra-renal albuminuria the amount of albumin present is generally small, often only a trace. It may be the only obvious sign of organic disease, and the following examples are given to illustrate its importance. In the medical examination of large numbers of recruits during the war, or drafts of men for service afloat, the finding of a trace of albumin in the urine was a useful indication of the presence of a urethritis which in many cases would otherwise have been overlooked.

A woman, aged 57, suffered from general loss of health, bronchial catarrh, indigestion, anæmia and other symptoms. After a very detailed investigation, including X-ray examination of the chest and whole digestive tract, the only evidence of organic disease was the constant presence of a faint trace of albumin and an excess of leucocytes in the urinary deposit. The urine was sterile on culture. In the absence of any symptom of dysuria, and because the albumin was only a faint trace and the cells but little in excess of normal numbers, no clinical significance was attached to this finding. Six months later the patient had an attack of cystitis. This led to cystoscopy and the discovery of four papillomatous masses in the bladder. If the indication of organic disease provided by the slightly abnormal urinary examination had been followed up, the correct diagnosis would have been made six months sooner.

A man, aged 43, was seen on account of persistent albuminuria following a nervous breakdown seven months before. His general condition was good and the cardio-vascular system was normal.

The urine contained albumin, but no casts, crystals or cells in the deposit. There was no history of Bright's disease or symptoms suggestive of it. A history of passing a renal calculus 20 years ago pointed to the possibility of another calculus. X-ray examination showed a small calculus in the right ureter close to its opening into the bladder. This was confirmed by ureteric catheterization. A small brown calculus was removed by operation by Mr. Girling Ball. The patient made a good recovery and the urine became normal.

In most cases of extra-renal albuminuria urinary examination leads to other findings, such as bacilluria, pyuria, and hæmaturia. The character of the hæmaturia may indicate the site of bleeding, and the absence of casts, or the presence in rare cases of such extraneous elements as carcinoma cells and eggs of *Bilharzia hœmatobia,* are other urinary signs of the extra-renal origin of the albumin.

(2) *Renal Albuminuria.*—(*A*) *Organic albuminuria :* The various forms of organic disease of the kidney will now be considered briefly and in general terms. In toxæmic kidney, which is due to bacterial and other toxæmias (febrile albuminuria is a common example of the condition), the kidney disease is conterminous with its cause. The condition is diagnosed in the presence of a sufficient cause for the albuminuria, especially if the urine is known to have been previously normal. The albuminuria is often accompanied by cylinduria, and there may be hæmaturia. A further reference is made to toxæmic kidney in the discussion of functional albuminuria.

Bright's disease is generally recognized by the presence of signs and symptoms of the disease in addition to albuminuria. Thus casts are found in the urinary deposit in all forms of Bright's disease at some stage in their course, except that there may be few or none in pure nephrosis. The presence of red and white blood corpuscles in the urinary deposit, or frank hæmaturia, is evidence of organic renal disease. There are cardio-vascular changes in most forms of nephritis, and the presence of retinitis may be diagnostic. The diagnosis of residual albuminuria is made when albumin persists after an attack of acute nephritis, from which attack recovery is complete in all other respects than the persistence of albumin. The diagnosis must always be made with caution; it can properly be made only after the lapse of at least a year or two, because in many cases at first thought to be residual albuminuria the condition is found later to be one of slowly progressive chronic nephritis.

Arteriosclerotic kidney is recognized by the presence of a trace of albumin, and perhaps a slight excess of granular and hyaline casts in a hyperpietic subject in whom no other cause for albuminuria, such as heart failure, is discovered. Senile kidney, as its name implies, is a diagnosis only made in old people, and is due to arteriosclerotic changes in the renal vessels.

Surgical diseases of the kidney rarely show themselves either first or chiefly by albuminuria. They are generally recognized by pain, pyuria or hæmaturia, symptoms of dysuria, and signs of local disease. In renal carbuncle and perinephric abscess a trace of albumin may be the only urinary abnormality, and it may be sometimes observed in tuberculosis and new growths of the kidney before the disease has declared itself in other ways.

(*B*) *Functional albuminuria*: This is approached by the exclusion of extra-renal and organic renal albuminuria, that is to say it is suspected when albuminuria is discovered in otherwise normal urine in a healthy subject in childhood or adolescence. It reaches its maximum incidence in adolescence, and is therefore often spoken of as adolescent albuminuria. The quantity of albumin is generally slight, it is often only a trace, but it may amount to as much as 1 gram per litre, and possibly even 1 gram per cent. in some cases. Massive or considerable albuminuria is nearly always due to organic disease.

A single woman, aged 31, was seen with Dr. Parry on account of albuminuria (1 to 2 gm. per litre) which had been present for six months past and had been regarded as functional. No blood cells or casts had been found in the urine. The patient's general condition was good. The heart and blood pressure had been normal throughout. A history of œdema of the legs three months previously was given, but it was only in reply to definite questions that the patient remembered occasional headaches at that time, puffiness of the eyelids one morning, and swelling of the backs of the hands on the following day. This history pointed to nephrosis, the presence of which was confirmed by blood examination. Blood cholesterol 484 mgm. per cent., blood urea 25 mgm. per cent., plasma proteins, albumin 3·32 gm. per cent., globulin 1·66 gm. per cent. Two months later plasma proteins, albumin 2·75 gm. per cent., globulin 2·3 gm. per cent., blood cholesterol normal (213 mgm. per cent.) *

In rare cases even considerable albuminuria may apparently be functional. Thus, Stirling reported in 1887 the case of a young man, aged 23, who had been under close medical observation for six years on account of massive albuminuria. He was in good health at the age of 62 in 1926, and the albuminuria had ceased only a few years previously.

Functional albuminuria is characteristically intermittent, though it is not uncommonly persistent. It may appear only after meals, it may be present only during the day and absent in the urine secreted during the night. These variations in its appearance are determined by such factors as the upright posture, lordosis and circulatory disturbance. Some types of functional albuminuria are accordingly called lordotic, orthostatic and cyclic albuminuria. At one time all orthostatic albuminuria was attributed to lordosis. Now it is known that the upright posture may be responsible for albuminuria without lordosis, and that lordosis produced by placing a pillow under the back of a patient lying on his back in bed may cause albuminuria. Orthostatic and lordotic albuminuria are, therefore, independent events, though they are often coincident. A number of explanations have been offered to account for lordotic albuminuria. There is

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* The average normal quantities of plasma proteins are albumin 4·1 gm. per cent., globulin 2·6 gm. per cent., total protein 6·7 gm. per cent.

some evidence that it is due to obstruction of the blood-flow in the left renal vein produced by stretching and compression of the vein by the increased lumbar curve. It has been shown by ureteric catheterization that in some cases at least the albumin comes entirely from the left kidney. In other cases, when there is albumin in the urine from both kidneys, that from the left is in excess. James Russell, in October 1923, described two cases of unilateral œdema with albuminuria. In one of these the albuminuria was persistent, but an orthostatic or postural reaction was marked. There was no lordosis. When the patient stood for seven minutes leaning over towards the right the albuminuria was not increased. When she stood leaning over towards the left the urine became almost solid with albumin. Russell offered as an explanation of the association of albuminuria and unilateral œdema, an abnormal return of blood from the left lower limb through a persistent post-cardinal vein emptying into the left renal vein. The fact of albuminuria being intermittent, whether cyclic or orthostatic, is, however, no proof that it is functional. It is well known that minor degrees of nephritis, sometimes early in their onset and often late in convalescence, have intermittent albuminuria.

The kind of protein has been thought significant in the diagnosis of functional albuminuria. The protein may consist entirely of globulin, and characteristically there is more globulin than albumin. These features, however, are not pathognomic. In organic albuminuria there may be more globulin than albumin, and in a case of chronic nephritis, which afterwards came to post-mortem examination, the whole protein passed in the urine was globulin.

It will be seen, therefore, that the diagnosis of functional albuminuria cannot be made with certainty by the kind or quantity of protein in the urine, nor by the conditions affecting its presence. In general terms, functional albuminuria is a condition of childhood and adolescence. It tends to disappear in adult life, and the diagnosis of functional albuminuria should not be made when albumin first appears in adult life.

The diagnosis is made by the exclusion of organic disease, particularly the absence of coincident cardiovascular disease, and the absence of excess of cells and casts in the urine. In doubtful cases renal function tests and chemical examination of the blood may help.

Treatment of functional albuminuria.—The subjects of functional albuminuria may be perfectly normal both in function and structure. In some healthy children and adolescents it seems to be attributable to their having overgrown their strength. Its association with lordosis has already been referred to. It is not uncommonly due to over-fatigue, as, for instance, in schoolboys who excel in work and games, and in consequence overtax their strength. In many cases, however, there are functional disturbances, especially vasomotor and nervous instability. Langdon Brown has described a group with cold, clammy, congested extremities and a large easily compressible pulse, and another group in which the subjects are spare, highly-strung and neurasthenic. Vasomotor instability may be shown by a tendency to fainting, tachycardia, and palpitations; there may be well-marked variations in blood-pressure from hour to hour or day to day, and posture may have a considerable influence in blood-pressure. Other cases present anæmia and defective nutrition.

These etiological factors indicate the general lines on which treatment should be based. When it is a case of the subject having outgrown his strength, sufficient rest must be ordered, particularly extra time lying horizontal in every 24 hours. For nervous instability care is taken to avoid too much mental activity and emotional strain; for lack or disorder of vasomotor control regular exercise is prescribed, and attention is given to general hygiene, including food, digestion, clothing, and the like. Apart from these special indications for treatment, calcium lactate in doses of 10 grains thrice daily may be tried for a period.

Some cases of functional albuminuria belong really to the toxæmic kidney group, and are due to infected tonsils, dental sepsis, and similar conditions. Latent tuberculous infection—tuberculous mesenteric glands, for instance—may be the cause of slight albuminuria in a weedy youth. In fact, it is probable that many cases of simple functional albuminuria really belong to the group of toxæmic kidney, and in the treatment of the condition this aspect of the case must receive careful attention.

When a boy with functional albuminuria, but otherwise healthy, goes to a public school he should be allowed to play games and live the ordinary school life. Some little extra care should be taken to protect him against exposure to cold; it will probably be enough to see that he has good underclothing. He should be under the observation of the school medical officer, who will observe whether the boy gets over-tired after exercise, and whether games have any marked effect on the albuminuria. Very strenuous exercise, such as racing and long-distance running, are best avoided at first. But if, after observation for a few terms, the boy's health is obviously good, all restrictions can be withdrawn, except that in the case of an intercurrent infection, such as tonsillitis or influenza, the urine should be examined both for albumin and casts. The kidneys' reaction to infection may throw some light on whether the case is really one of functional albuminuria or latent chronic nephritis. Fortunately for many boys and girls their functional albuminuria is undiscovered. There must, indeed, be many conditions of which we are at present ignorant that are responsible for slight and harmless albuminuria, for it has been found by several observers that, in the routine examination of hundreds of apparently healthy adults, in about 5 per cent. there is a slight albuminuria.

Cystitis

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CYSTITIS is a common condition, typically implying the frequent and painful passage of pus-containing urine. If there is no pus in the urine, there is no cystitis. Therefore, before diagnosing it, the presence of pus must be proved. Such physical and chemical tests as the boiling test for albumin and the potassium hydroxide test for pus are crude, and may be negative when pus is discoverable microscopically; nor, if the former is positive, is anything proved as to the presence of pus, as the albumin may be present in other forms. It is true that, with a white deposit in alkaline urine, the addition of acetic acid will distinguish phosphates from pus, by dissolving the former; but it must be emphasized that the only test which always enables one to say that pus is or is not present is the microscopic presence or absence of pus cells. In the milder forms of cystitis pain may be negligible or absent. Therefore the presence of pyuria is an essential feature in the differential diagnosis of cystitis from those numerous other conditions in which increased frequency of micturition is present—as, for instance, owing to the polyuria of diabetes mellitus and insipidus, chronic interstitial nephritis and hysteria; in cases of oxaluria and phosphaturia; and when the prostate is " enlarged."

In distinguishing from the pyuria of cystitis that in which the pus is derived from below the bladder (as in urethritis, prostatitis, vesiculitis), one notes the history of exposure to the risk of contracting venereal disease, redness or œdema of the external urethral meatus, and the presence of a urethral discharge and of prostatic or vesicular tenderness on rectal examination. Gonococcal cystitis is said to be rare, the many-layered transitional bladder epithelium presumably offering greater resistance to the inroads of the gonococcus than the more delicate columnar epithelium of the urethra. But it is difficult to see how certainty on this question can be reached, since cystoscopy is contra-indicated in urethritis, and since the symptoms of cystitis are closely simulated by inflammation of the adjacent prostate and posterior urethra which are involved in a large proportion of cases of urethritis. And, in any case, the question is of rather academic interest, since treatment is primarily directed to the urethritis.

In excluding the bladder as the source of pus, the two- or three-glass test is useful. If, while urine passed into the first glass is purulent, that passed into the second is clear, cystitis is absent; if also purulent, it is not equally certain that cystitis is present. The source of pus from a chronically inflamed prostate or vesicle can be shown, after massage of these regions per rectum, if, when the urine passed into the second glass is clear, the remaining urine, passed into yet a third glass, after massage, contains pus; or if, though the second glass contains a little pus, the third shows considerably more. It will thus be seen that, in the presence of inflammation of the urethra and its off-shoots, it is easier to affirm the absence, than the co-existence, of cystitis. As already mentioned, such co-existence, difficult to diagnose, is therapeutically subsidiary. For the purposes of this article, we are considering, not urethritis, but pyuria in which the pus is already contained in the urine as it leaves the bladder, where it has originated. This implies that cystitis is to be distinguished from all those renal conditions (pyelitis, pyelonephritis, pyonephrosis, renal calculus, and renal tuberculosis) in which pus is discharged into the bladder. While the two may co-exist, so that, for instance, we have a condition of pyelo-cystitis, the contrary is, perhaps, more often the case.

The pus from a pyonephrosis, or organisms alone, as in bacilluria, may pass through a bladder without causing cystitis. Organisms have also been experimentally introduced into the bladder from below, with similar failure to cause cystitis.

It is this resistance to infection of the healthy bladder (and only a healthy bladder can be so treated with impunity) which allows of posterior irrigations into it in cases of chronic urethritis; for, though antiseptic solutions are employed, these are necessarily weak, and probably act mainly by mechanical flushing away of infective discharges. The important thing to realize is that, for cystitis to occur, something more is necessary than the arrival of organisms into the bladder. Thomson-Walker says: " If bacteria reach the healthy bladder by the urethra or through the kidneys, cystitis is not produced in the majority of cases. Urine which is swarming with bacteria may be passed through the bladder for years without producing cystitis."

Thus the predisposing causes of cystitis are of decisive importance in determining its onset. The most important of these are: (1) stagnation of urine in the bladder; (2) injury of the bladder; (3) congestion of the bladder. Taking the last-named first, we may instance sexual and alcoholic excess and exposure to cold as favouring congestion of the bladder; also, perhaps, some mysterious individual predisposition by which, as Romanis and Mitchiner well say: " There are some people who appear to take cold in their bladders rather than in their nose or throat."

So important are these predisposing causes of cystitis, in the absence of which the organisms seem powerless to produce it, that one is tempted to reverse current opinion, and regard, not the organism, but rather the so-called predisposing cause, as the exciting one, thus agreeing with the popular phraseology of those who, knowing nothing of organisms, perhaps rightly attribute their ills to " catching a chill," or sitting in a draught or on a cold stone. The truth, it would seem, is that the terms "predisposing" and "exciting" causes are relative and interchangeable; both are necessary to the production of cystitis or any other inflammation. Since, however, the organisms which may cause rhinitis are constantly present in the nose, and since the organisms which cause cystitis may be present for years in the bladder, without causing inflammation until the so-called predisposing cause acts, it does seem as if the term "exciting cause" should apply to the final event which pulls the trigger (e.g. sitting in a draught or on a cold stone) rather than to the previously present, but harmless, bullet—the organism.

The rarity, with correct technique, of cystitis caused by urethral instrumentation is well shown by figures assembled by Cairns who, in a period of five years at the London Hospital, could find no certain case of cystitis ascribable to infection at cystoscopy. He naïvely says: "We admit that our technique is good, but we do not flatter ourselves that, during this period in which over 3,000 cystoscopies have been performed, we have been able in every case to prevent bacterial infection of the bladder. It is, therefore, clear that in addition to bacterial infection some other factor is necessary for the production of cystitis." In thus laying stress on the inadequacy of organisms, unaided by other factors, to produce inflammation, it is not desired to belittle the need for asepsis in urethral instrumentation, but rather to emphasize the still greater importance of avoiding trauma of the urethra or of the bladder neck or walls—an importance well illustrated in the dictum of Keyes that "The cleaner you are the better, but the gentler you are the best."

As a special variety, one may here mention the "cystitis of marriage" and "honeymoon pyelitis" as arising from an unaccustomed combination of some of these causal factors, such as pelvic congestion, together with trauma in the form of minute abrasions permitting the absorption of organisms, with predisposition, uncleanliness, roughness, and excess (any or all of these) as probable abettors. Recently I saw at the West London Hospital a woman of 21 who, within a month of marriage, was suffering from an already resolving cystitis, which was cystoscopically confirmed. An elder sister had similarly suffered on marriage.

Other varieties of damage to the vesical epithelium leading to cystitis are provided by a stone or by a foreign body in the bladder (the rougher these are, the greater the risk of cystitis), while both, especially the former, may also predispose to cystitis by temporarily obstructing the outflow of urine. The increased frequency, like the other symptoms, caused by a stone, is mainly noticeable by day; that due to enlarged prostate, by night. In both conditions, once cystitis has set in, increased frequency occurs both by day and by night; and the cystitis itself favours secondary stone formation. A special type of damage to the bladder epithelium, by leading to its necrosis, is caused by a malignant neoplasm. Whereas an ordinary papilloma of the bladder is found with clear urine, a carcinoma soon ulcerates, becomes coated with phosphates, and often masquerades as a cystitis, with exceptionally offensive urine. Since a bladder growth may co-exist with urethral stricture, a foul cystitis persisting after full dilatation of the stricture calls, like any other cystitis persisting unduly, for cystoscopy.

As an obvious cause of damage to the bladder may also be mentioned cystotomy. But here, as the trauma is single and aseptic, and the bladder closed at the same sitting, cystitis is not clinically noticeable, especially since bladder drainage by catheter usually follows. With cystostomy, in which the damaged area is kept open, allowing more opportunities for the entry of organisms, there is a greater risk of infection; but, as good drainage is simultaneously provided, the cystitis, with scrupulous care in the after-treatment, is usually very slight and transient. But perhaps even more important than congestion and injury of the bladder is stagnation of urine in it. Anything which prevents the complete emptying of the bladder—which, in other words, allows of the remaining behind of residual urine—favours the onset of cystitis. Common causes of this are urethral stricture, enlarged prostate, bladder sacculi and diverticula, cystocele, and nervous lesions, exemplified by tabes dorsalis and atony. Stricture is not, as is enlarged prostate, associated with any marked degree of residual urine, but does lead to dilatation and congestion of the urethra proximal to it, and, unlike enlarged prostate, being primarily an infective condition, is very prone to lead to cystitis.

Stagnation of urine, injury, and congestion are therefore the main local predisposing causes of cystitis, and often, in varying degrees, act in combination. Thus, a stone in the bladder causes congestion and repeated minute injuries of its walls, with a certain amount of occasional intermittent obstruction to the outflow of urine. The congestion of the mucosa over an enlarged prostate projecting upwards into the bladder is illustrated by the spontaneous hæmaturia in which it may culminate; residual urine is usually present; and injury, sometimes caused by complicating stones, is frequently added by the necessity for repeated, and often difficult, catheterization.

To such local causes must be added cystitis caused by direct spread, as when an appendix or other abscess bursts into the bladder (I have known one arising from pubic osteomyelitis to do so); or when the bowel comes to communicate with the bladder, as in the fistulæ of diverticulitis or malignant disease; or when infection is favoured by manipulations close to the bladder, as in hysterectomy or excision of the rectum. After the latter operation, in which a catheter is tied in for four or five days, and its end closed with a wooden spigot, Dukes found that the incidence of cystitis is reduced by the substitution of an antiseptic seal for the wooden spigot.

Now, although the bladder is normally meant to hold urine, yet in the days following an operation which renders the bladder prone to infection, and after which a catheter is tied in, that may further predispose to infection by producing congestion or small bruises of the bladder neck as the patient moves, the bladder should surely be placed at rest, and not be made to hold any urine at all. In its liable phase such urine is almost equivalent to residual urine in an otherwise healthy bladder, with the addition of potential danger in the column of urine inside the catheter, placing the bladder in direct communication with a spigot which it is difficult to keep clean. Perhaps the incidence of post-operative cystitis might be still further reduced by the omission of all obstructing seals, thus providing continuous free drainage for the bladder during the time in which it is liable to infection; for a spigot, whether antiseptic or not, provides that very element of stagnation of urine which, as above mentioned, is a fertile predisposing cause of cystitis.

Besides the urethral route, as in urethritis, septic catheterization, and vulvo-vaginitis, and besides direct spread from the bowel or other pelvic source, infection may also reach the bladder by the ureter or its lymphatics. Now, although, as already stated, organisms may pass down to the bladder for years without affecting it, yet cystitis not uncommonly results, and, in the case of tuberculosis, almost always does. Primary tuberculous cystitis is practically unknown, the bladder lesion being nearly always secondary to a similar renal affection; less often the prostate, vesicle, or epididymis is responsible. After removal of the affected kidney, the tuberculous cystitis, if not too advanced, clears up. Increased frequency of micturition, when found associated with an acid sterile pyuria in a young adult, should make one think of renal tuberculosis, of which it is the earliest symptom. The urine is also acid in cystitis caused by the *Bacillus coli* or the gonococcus. An alkaline cystitis may be due to staphylococci and streptococci and *B. proteus.* The increased frequency of renal tuberculosis exists, as proved by cystoscopy, apart from any visible involvement of the bladder, and is ascribable to a reflex; that is to say, that the kidney and bladder partially sharing a common segmental innervation, sensations are referred from a normally silent organ (the kidney) to one (the bladder) which is physiologically vocal in giving rise to sensory impressions.

Renal tuberculosis is a good example of the fact that increased frequency of micturition, which, when pyuria co-exists, is generally regarded as a symptom of cystitis or, at any rate, an affection of the bladder and its neighbourhood, may be due to a purely renal lesion. Though a feature of renal tuberculosis, increased frequency of micturition may also be found in ordinary non-tuberculous pyelitis. Other ways, besides reflex action, in which an affection of the kidney may be supposed to cause increased frequency of micturition, are by the irritating character of the urine, by the polyuria often associated with an early renal lesion, and by involvement of the ureteric orifice, which, while the rest of the bladder appears healthy, may, in pyelitis, be pink and puffy.

Fever is an important sign in distinguishing pyelitis from cystitis. Fever with pyuria points to pyelitis or prostatitis rather than to cystitis. Just as primary tuberculous cystitis is very rare, so is any primary cystitis rare. One must cultivate the attitude that cystitis does not occur without some cause, for which one must search, and which must, if possible, be eliminated. In this search the following paths of inquiry are prominent. The history may give important clues. For instance, it may suggest the possibility of a urethral stricture, or of kidney trouble, originating, perhaps, during pregnancy; of pelvic disturbances, or of the recent passage of an instrument into the bladder.

Clinical examination, of course, is also important. Tenderness may be felt over a kidney, the seat of pyelitis, calculus, or tuberculosis; a lump in pyonephrosis; hypogastric tenderness in cystitis. Absent knee-jerks and inactive pupils are suggestive. Vulvo-vaginitis or a cystocele may be found. On rectal examination one may feel an enlarged prostate or a bladder growth.

Not long ago a curious clue was furnished by an apparently double external urethral meatus in a female aged 31, complaining of pain on passing water which was purulent. There was hourly frequency of micturition. Cystoscopy showed a large stone, and the cystoscope, on being withdrawn from the anterior orifice and passed through the posterior one, was visible through the former, the two being separated merely by a superficial bridge of tissue. A bladder-stone in a female is unusual, and raises the question of a foreign body as a nucleus. In this case the double urethral meatus strengthened the suspicion of trauma by a foreign body. On being questioned, the patient admitted having attempted to produce abortion with a piece of slippery elm, and this was afterwards found inside the stone. She had been treated for months for "cystitis," by means of copious fluids and bladder-washes.

Examination of the urine, while proving the presence of pus (indispensable for a diagnosis of cystitis) may reveal tubercle bacilli, which should be looked for even in the obvious presence of other organisms, since these may represent a secondary infection. Occasionally bilharzial ova may be found, when there will be a history of residence in certain countries, especially Egypt, and yellow nodules will be seen on cystoscopy.

Radiography is of prime importance in the diagnosis of renal and ureteric calculi, and also reveals calcifications in old tuberculous kidneys, and even of the bladder itself in cases of encrusted cystitis. In combination with pyelo-uretero-cystography, both by the older urethral, and by the newer intravenous route, radiography is of very great help in the elucidation of foci of urinary infection which may be keeping up cystitis.

But cystoscopy, though it may be rendered impossible by a urethral stricture or enlarged prostate, is perhaps the most useful of all methods of investigation in such cases. Besides confirming the diagnosis of cystitis, it often finds its cause, as by discovering residual urine, a stone or foreign body in the bladder, an intravesical projection of the prostate, bladder sacculi or diverticula, vesical tuberculosis or neoplasm, evidence of pyelitis or pyonephrosis, or the restriction of the inflammatory process to a particular part of the bladder, as in trigonitis, frequently associated with female pelvic trouble.

TREATMENT

With regard to treatment, in acute cystitis the patient should be in bed, kept on very light diet, and made to drink large quantities of water or barley water. Heat to the hypogastrium and hot hip-baths afford comfort, while bladder symptoms are relieved by alkalis and hyoscyamus. No instrument should be passed into the bladder. Occasionally, as in acute hæmorrhagic cystitis with clot retention, cystostomy is required.

In a study of 28 cases of catheter cystitis, Dukes found that " Neither hexyl-resorcinol, hexamine, nor methylene blue has any curative effect on these infections," but that " alkaline treatment is followed by a rapid amelioration of symptoms," even though " to make the urine alkaline does not make it antiseptic." His conclusions were given in a joint discussion on urinary antiseptics by the Sections of Urology, Pathology, and Therapeutics and Pharmacology of the Royal Society of Medicine, and the whole discussion is well worthy of study by enthusiasts on the subject of urinary antiseptics, whose opinions it should serve to modify.

In chronic cystitis it is usual to give hexamine. If so, it should be given before meals, to avoid its irritating effect on the stomach; and the urine should be acid, acid sodium phosphate, if necessary, being given after meals. To produce its maximum effect, a urinary antiseptic should be concentrated by withholding drinks. These, however, are very valuable in washing away infective products, and their obvious value in this direction may be held to outweigh the problematical value of urinary antiseptics. But the main point on which too much emphasis cannot be laid is that chronic cystitis calls for investigation, especially by cystoscopy, in order, if possible, to discover factors responsible for its continuance. The removal of these factors will be followed by the disappearance or, if they have acted too long, by the improvement, of the cystitis.

The treatment of cystitis, then, may involve that of urethral stricture or enlarged prostate, of bladder-stones, growths, and diverticula, of cystocele, and of various renal lesions, whether by nephrectomy, as in tuberculosis, or, as in pyelitis, by attention to the condition of the bowel, the appendix being sometimes the source of the absorbed organisms. Where the responsible factors cannot be removed, as, for instance, in cases of sacculated bladder, or where there is residual urine, but operation is contra-indicated, or where pre-operative abatement of cystitis is intended, bladder irrigations are valuable, the catheter being tied in, if the patient is in bed, and thus affording the additional advantage of continuous drainage. The way in which residual urine acts by affording material for constant re-infection of the bladder is shown by the increasingly purulent appearance of the last portion of urine drawn off, the pus settling down to the bottom of the bladder, and never getting properly voided.

The problem of cystitis can be best summed up in the words of Langdon Brown, who, in introducing the discussion referred to, said that: "All urinary infections which do not improve quickly under ordinary medical measures should be examined by the cystoscope and ureteric catheter for mechanical difficulties and for evidence of tuberculosis, which may be the primary cause of various secondary infections." The magically satisfying word cystitis has too long been a sort of urological Cinderella or diagnostic maid-of-all-work. In directing attention away from bacteria, and in emphasizing here *ad nauseam* the importance of the so-called predisposing causes of cystitis, it is wished to enforce two points. The first is that, for practical purposes, cystitis (including tuberculous cystitis) will, as a rule and if not of too long standing, resolve unless there is some special factor maintaining it, such as constant re-infection from the kidney or the presence of residual urine in the bladder. The second, which follows from the first, is that, rather than pin his faith to urinary antiseptics (which, each in turn, arise and fade like will-o'-the-wisps on the therapeutic horizon), it is the duty of the practitioner, in every case of cystitis not rapidly resolving, to search by all possible means for causes preventing resolution. Such means include clinical examination, microscopical and bacteriological investigation of the urine, radiography of the urinary tract, inquiry by catheter for the presence of residual urine, cystoscopy, ureteric catheterization, and pyelography. After the elimination of factors maintaining cystitis, it will usually clear up as certainly as it spontaneously does in their absence; and that, without the help of urinary antiseptics; whereas oceans of these will not abate cystitis until such predisposing factors are removed.

CONCLUSIONS

Organisms alone do not cause cystitis in the absence of predisposing causes, the most important of which are stagnation of urine in the bladder, and injury and congestion of the bladder. Primary cystitis is rare, the bladder condition being often secondary to a renal lesion. Any cystitis not rapidly resolving must be thoroughly investigated, especially by the cystoscope, for the presence of stone, foreign body, intravesical projection of the prostate, sacculi and diverticula, tuberculosis, neoplasm, or for evidence of pyelitis or pyonephrosis. Treatment must be directed to these factors, not merely to the associated cystitis. Alkalis relieve acute symptoms, but copious fluids are more important than urinary antiseptics.

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The Modern Treatment of Varicose Veins

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THERE can be no doubt that, provided there are not any contra-indications present, varicose veins are best treated by injection in preference to the old method of operation which necessitated the removal of all the visible and palpable subcutaneous veins in the lower limb through one or more incisions, this being a slow and tedious undertaking and unsuitable for advanced cases. The disadvantages, too, of operation, involving an anæsthetic, invalidism, and consequent loss of time and money, the possibility of attendant sepsis and pulmonary embolism, are avoided, as the injection treatment can be carried out in a consulting room or private house, causing neither break in the patient's ordinary daily routine nor his lying up, even for a short period. The likelihood of recurrence, often seen even after the most thorough operation, is also negligible where the injection treatment is concerned, and patients are highly gratified by the simplicity, painlessness, and permanent results.

The injection treatment, although over 100 years old, only came to the fore during the Great War, and then largely through the efforts of Sicard, Gaugier, Forestier and Génévrier in France, where their technique and the solutions used were superior to those previously employed. The first mention of the treatment in British journals was by Dunbar in 1925, followed in 1926 by Alexander's and Douthwaite's accounts of their successful experiences with the treatment. Many varicose vein clinics now exist all over the country, and many general practitioners have enthusiastically adopted the treatment, testifying to its increasing success and popularity.

The object of the injection treatment is to introduce into a varicose vein a sclerosing solution of sufficient quantity and strength to produce chemical injury or irritation in the endothelium, this being followed by clotting and obliteration of the vein. The artificially formed thrombus is rapidly organized and adheres firmly to the vein wall. An extensive, aseptic, inflammatory process takes place in the clot, which becomes permeated with fibroblasts and minute young blood vessels, and is eventually converted into a mass of fibrous tissue, leading to shrinkage and gradual obliteration of the vein, in the place of which small, attenuated, hard cords are formed. Owing to their resistance to corrosive agents, the sclerosing solution has little or no effect on normal veins. Demonstrations show clearly that when the patient stands erect, the circulation in a varicose vein is towards the periphery, making the risks of pulmonary embolism and infarction due to the injection very remote.

SOLUTIONS FOR INJECTION

Practically any chemical solution injected into a varicose vein will produce some degree of thrombosis. I have myself tried over a hundred of the vast number of solutions employed at one time and another, but it can certainly be stated that the ideal solution has not, as yet, been found. The qualities which an ideal solution should possess are that it should be cheap and easily dispensed; it should be stable, should preserve its original form for an indefinite period, and not undergo any decomposition through physicial agents; it should be colourless, non-toxic, and in itself sterile and antiseptic; it should produce a maximum amount of sclerosis with a minimum amount of local or constitutional disturbance, and if by error or mischance injected into the subcutaneous tissues it should not produce an injection ulcer—the bugbear of the treatment. The most generally popular solutions in use at the present moment are:—

(1) *Lithium salicylate* 30 *per cent., tutocaine* 1 *per cent.* (*lithocaine*).—This, in my opinion, is the best solution, and can be recommended for the majority of cases. It has been in constant use at the Royal Waterloo Hospital Varicose Vein Clinic since 1926, and is freshly prepared for use each week. If kept for longer than two or three weeks discoloration sets in, due to the combination of the lithium salicylate with the iron present in the glass of the vessel. Messrs. Crookes, however, put up the lithocaine in ampoules made of iron-free glass, in which it will keep for over a year. It is pale straw coloured, non-toxic, painless when injected owing to the presence of tutocaine, and as a sclerosing solution is unsurpassed. If injected subcutaneously it will produce necrosis of the tissues. The usual dose is 4 c.cm., but this will vary with the extent of the varicosities; it is unwise to inject more than 8 c.cm. or less than 2 c.cm. into one limb. The resulting clot is very firm, hard and extensive, with a minimum amount of local reaction.

(2) *Quinine hydrochloride* (*B.P.*) 4 *grams, urethane* 2 *grams, distilled water* 30 *c.cm.*—This is Génévrier's solution, and has many advocates, including Douthwaite. It is a stable, colourless solution, and keeps indefinitely; as the quinine tends to crystallize out of solution it is necessary to boil it before use. The dose varies from ½–2 c.cm., but not more than 3 c.cm. should ever be injected at one time. Test for idiosyncrasy may be previously made, either by giving the patient a small injection (say, ¼ c.cm.), or by placing one drop of 1 per cent. quinine hydrochloride solution on the patient's forearm, and scarifying the skin under it, sterile water being used as a control. Where sensitiveness exists a definite wheal, surrounded by a zone of erythema, appears about ten minutes later. Quinine-urethane injection is painless, and the sclerosis is

usually extensive and satisfactory. It has, however, the following disadvantages: (*a*) Cinchonism: some patients, although unaffected by small doses of quinine, will, on being given the larger amounts, show alarming symptoms of cinchonism. (*b*) In approximately 10 per cent. of cases the injection of quinine will produce nausea, giddiness, fainting, buzziness in the head, and cramp-like abdominal pains; if more than 3 c.cm. is injected some patients will actually faint, develop skin rashes, or present severe symptoms of collapse from which they may take a considerable time to revive. (*c*) Quinine is a well-known abortifacient, and should not be employed in patients suspected of being pregnant, or even in those who are menstruating; it will sometimes produce menorrhagia and uterine colic. (*d*) If injected subcutaneously it will, like most solutions now in use, produce an injection ulcer which is indolent and takes many weeks to heal.

(3) *Salt solution.*—This is composed of 20 per cent. sodium chloride, to which has been added 1 per cent. tutocaine. Provided the needle can be introduced into the small, apparently intradermal veins which sometimes occur, this solution is ideal for such, but has practically no effect on large veins. Strong solutions, too, are unsuitable for these small veins, often causing intense pain, aseptic inflammation of the subcutaneous skin, and sometimes sloughing of the vein coursed.

(4) *Sodium morrhuate.*—Sodium morrhuate is a soap, being the sodium salt of a fatty acid extracted by saponification from cod-liver oil, and is dispensed in 5 per cent. and 10 per cent. strengths, 0·5 per cent. phenol being added as a preservative. Although the 5 per cent. solution is the one of choice, the 10 per cent. is required for obstinate or advanced cases. The dose varies from ½–1 c.cm. at intervals of three to four inches for average cases, and 5–10 c.cm. as a maximum at one sitting where a stronger dose is required. If injected subcutaneously this solution seldom produces

an ulcer. Many injections being possible at one time, the total number of sittings necessary will be materially reduced, and two or three will usually complete the treatment. In spite of its advantages, however, my experience of the solution has been mainly disappointing as regards end-results, 30 per cent. of cases showing some degree of recanalization. The development of urticaria after an injection in 5 per cent. of cases, while causing no permanent damage, is naturally disquieting at the time. The pale yellow-coloured solutions are preferable to the darker, the latter making it difficult to see if the blood has been withdrawn into the syringe prior to injection.

(5) *The "twin injection."*—Certain large tortuous veins are very difficult to sclerose, even where massive doses of quinine-urethane, lithocaine, or sodium morrhuate have been given. Such cases treated by the "twin injection" are, however, invariably satisfactory, and there is no vein so large, no varicose condition so extensive, that cannot eventually be made to yield good final results by this method. Quinine-urethane 2 c.cm. and lithium salicylate 4 c.cm. are injected from two separate syringes simultaneously at a distance of two to four inches in the same vein. The two solutions are incompatible, and when mixed together produce a white, stringy, glutinous precipitate which adheres to the vein wall, and in all cases produces a very firm, extensive and satisfactory thrombus. The "twin injection" cannot be given single-handed.

TECHNIQUE

Before undertaking the injection treatment, patients should be completely overhauled, special attention being given to the cardio-vascular system, the liver, kidneys, pelvic organs and areas of focal sepsis. The urine should always be examined, as any evidence of diabetes or nephritis would at once place a bar on the treatment. Age is no contra-indication, as the injection treatment has been successfully practised in the young and in the very aged.

It is of the utmost importance that *both* lower limbs be carefully examined, even if the varicose veins are limited to only one portion of a leg. The operator should also make quite sure that it is actually a case of varicose veins, and not merely one in which normal veins are unduly prominent through wasting of the limb or lack of subcutaneous tissue.

(1) *Syringe.*—No special syringe is required for the treatment, although many varieties are on the market. I recommend a 5 c.cm. Record syringe; it can be sterilized by keeping it in surgical spirit, and rinsing it thoroughly in water before use. An ordinary hypodermic needle, No. 15 or 16, is preferable to the small and specially constructed ones often advocated.

(2) *Amount to be injected at each sitting.*—If quinine-urethane is used, not more than ¼–½ c.cm. should be injected at the first sitting; subsequently 1–2 c.cm. may be used, either at one or more points in the vein, the total amount not to exceed 3 c.cm. Slight cases will require few sittings, severe cases five, or even six. With lithium salicylate the average case receives 4 c.cm. at weekly intervals. If sodium morrhuate is used five to ten injections of ½–1 c.cm. may be given. It is useless to inject less than 4 c.cm. of salt solution, the usual dose being 5–10 c.cm.

(3) *Position of the patient.*—When the injection is to be given on the anterior aspects of the thigh or leg, the patient may be seated with the foot supported on a low stool. If the veins are situated posteriorly, the patient may either stand or lie supine. Where the veins are very large, the injections should be given with the patient prone on a couch, so that the veins may be as collapsed as possible, and the maximum area of the vein wall be affected by the sclerosing solution. The patient should not stand erect on a stool, as, if he faints, he may injure himself with his fall.

(4) *Tourniquet.*—A tourniquet is only necessary

where the veins cannot be rendered prominent, and then a pneumatic tourniquet, fitted with a valve so that the air pressure can be speedily released, is recommended.

(5) *The injection.*—The area of injection is dabbed with surgical spirit, coloured disinfectants being unsuitable, as they obscure the site. Ether and acetone, if used, may produce chilling and contraction of the vein, rendering the injection more difficult. The syringe is then loaded, the needle affixed, the vein steadied with the fingers of the left hand, and the needle plunged into the lumen of the vein. As the introduction of the sclerosing solution outside the vein, and into the subcutaneous tissue, is the one great bugbear of the treatment, a certain quantity of blood should first be aspirated back into the syringe to make sure that the needle is actually lying in the lumen of the vein, and the injection should never be proceeded with until this fact is assured to the operator. The solution should be injected slowly and steadily, and if bulging occurs near the point of the needle, or pain is produced, it is better to make another attempt elsewhere. After the injection the limb is slightly raised, and the skin-puncture gently compressed with a swab soaked in surgical spirit, to prevent oozing and to disinfect the abrasion. If there is any bleeding the part is dried with cotton wool before a strip of plaster or elastoplast is applied. Provided no undue pain or discomfort is experienced, the patient may walk about as usual, but excessive muscular exercise should be avoided during the treatment. The injections are best started in the region of the foot, proceeding upwards at weekly intervals. More than one injection may be necessary at a sitting, this depending on the nature of the case and the solution employed.

Saphenous varix.—I have now successfully treated eight cases (all males) by the "twin injection" previously described. The clotting is confined to the saphenous varix, and does not extend into the saphenous or femoral veins. The patient is instructed not to sit or lie down for at least five hours after the injection.

CONTRA-INDICATIONS

The injection treatment is contra-indicated under the following conditions :—

(*a*) Deep thrombosis. Here the enlarged veins are compensatory, and if they are injected and sclerosed the œdema will be accentuated. Some mild cases are difficult to diagnose, but I consider that, if one leg is an inch or two larger than its fellow, injections are contra-indicated. Deep thrombosis should be suspected where there is any obvious pitting on pressure, or difference in colour and temperature.

(*b*) Phlebitis. Sclerosis of a vein, which is the seat of infection, may give rise to the detachment of the thrombus with pulmonary infarction or embolism. After phlebitis has subsided an interval of at least six months should elapse before undertaking injection.

(*c*) During pregnancy.

(*d*) In advanced cardiac, pulmonary, renal diseases, or diabetes.

(*e*) In marked cirrhosis of the liver.

(*f*) In generalized skin infection of the legs. Treatment should here be deferred until the skin condition has been successfully cured.

COMPLICATIONS

The main complications of the treatment are : (*a*) Injection ulcer. (*b*) Cellulitis or localized abscess. (*c*) Pulmonary embolism or infarction.

(*a*) *Injection ulcer.*—Sclerosing solution not introduced into the lumen of the vein may produce an ulcer, and I have seen it occur from 10 per cent. and even 5 per cent. strengths of sodium chloride. Quinine-urethane produces just as bad necrosis as do the salicylate salts, and the more solution misdirected, the worse is the necrosis, varying from redness and blistering of the skin to a dark gangrenous patch which is resistant to treatment and eventually leaves a depressed, discoloured, unsightly scar.

(*b*) *Cellulitis.*—This must be distinguished from chemical peri- and extra-venitis, resulting from too strong a solution, and is due to lack of aseptic care during injection. Abscess formation, which is rare, is obviously due to faulty technique or selection of cases.

(*c*) *Pulmonary embolism and infarction.*—As previously stated, the risk of such complications is negligible provided due care is exercised in the selection of cases. In the 25,000 injections I have given since 1926, I have only experienced one such case, and at the Royal Waterloo Hospital, where over 3,000 injections are given yearly, there has been no known case since the clinic started in 1926.

CONCLUSIONS

The injection treatment, although simple and efficacious, cannot be learned from books, and five or six visits to a well-equipped clinic are advisable before undertaking it. Some 80 per cent. of cases may present no difficulties, but for the remainder, where early deep thrombosis or incipient phlebitis, may lie hidden, special trained knowledge is essential.

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The Modern Treatment of Burns and Scalds

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IN recent years there have been signs of a widespread and increasing interest in the subject of burns and scalds. While attention has been directed mainly to the practical aspect of the subject, questions of theoretical importance have not escaped notice, nor has controversy been lacking. There is almost universal agreement that the modern treatment of these injuries is attended with much more success than was that of ten years ago, and only a few deny that the change is a result of therapeutic advances. In this article are given a brief but essential consideration of the clinical and pathological features of burns, and a description of present methods of treatment. The method of treatment described is that of tannic acid, introduced by Davidson,[1] and the account is based on experience of its use in more than 200 cases during the past six years. The majority of the cases were children under 12 years, and in a large proportion the injuries resulted from scalding.

CLINICAL AND PATHOLOGICAL FEATURES

In a previous publication the clinical course of burns was described as being divided into the following four stages: (1) of shock; (2) of acute toxæmia; (3) of septic toxæmia; and (4) of healing. It is convenient to discuss separately each stage in regard to clinical features, pathology, principles of treatment, and results of treatment.

Stage 1 : *Stage of shock.*—No lengthy description of the clinical features of shock is required here. The condition appears immediately or very soon after receipt of the injury, and is one of depression of all the vital functions. The outstanding characteristic is a fall of blood-pressure. The pathology of shock, in spite of the most prolonged and laborious investigation, is still a subject of debate. A close similarity, however, has been demonstrated between shock arising after burns and the " initial shock " of other injuries, such as war wounds, and there is much to support the view that both are due to a vasomotor disturbance.

Several facts relating to shock in burns demand special emphasis. Shock, however caused, is accentuated by pain, exposure to cold, and loss of fluid from the body. A low blood-pressure, if prolonged, can cause irreparable damage to delicate tissues, such as the central nervous system. In " initial shock " the effective blood volume is very probably diminished. The indications for treatment are, therefore, clearly to administer heat and avoid exposure, to relieve pain, to supply fluids, and to restore the normal level of blood-pressure. Experience has shown that the most effective method of raising the blood-pressure is to introduce into the circulation a colloidal solution of correct concentration, such as blood or gum saline. In burns the degree of shock bears a very close relationship to the extent of body surface involved. The extent may be described as " small " for burns of 10 per cent. or less of the body surface, as " moderate " for those between 10 and 30 per cent., as " extensive " for those between 30 and 50 per cent., and " very extensive " for those of more than half the body surface. Shock is invariably marked in very extensive burns, and usually severe in extensive burns. In burns of moderate extent it is variable in degree and rarely dangerous. In small lesions it is exceptional.

Shock of moderate or mild degrees can be easily combated by treatment based upon the principles mentioned before. A severe degree of shock is a very dangerous condition. Unless great care is taken, shock can easily be aggravated by ill-chosen procedures in local treatment, and if it has persisted for any time, it resists all known methods of therapy. Cases with very severe shock may die within a few hours of injury. Others make a partial recovery, but succumb ultimately after a period of circulatory depression lasting for 24 to 72 hours. Usually in the interval the temperature has risen, the appearance of apathy has given way to one of anxiety and restlessness, and vomiting has occurred. The cause of death is not easily determined, and in such cases death is usually ascribed to "shock." The factors which perpetuate the low level of blood-pressure are not thoroughly understood, but there are excellent reasons for believing that from several hours after injury toxic substances have been absorbed from the burned area. It might therefore be more accurate to state that death in such circumstances is due to acute toxæmia following upon severe shock.

Stage 2 : *Stage of acute toxæmia.*—The clinical features of this stage were at one time familiar to all with experience of burns. In cases with slight or no shock there was an interval of from 12 to 24 hours in which the general condition seemed entirely satisfactory. With the onset of toxæmia the temperature rose, the pulse and respiration rate increased, the colour became dusky or livid, a state of anxiety and restlessness or of apathy appeared, and vomiting was frequent. In its fulminating form, which was common in children, acute toxæmia was rapidly fatal.

Much evidence is available to support the view that "secondary wound shock" and also the acute toxæmia of burns are the result of absorption of a toxin or toxins into the circulation from the injured area. Recently, criticism has been directed at this view. The constitutional disturbances of burns have been attributed to concentration of the blood,[4] and the fall in blood-pressure mainly or wholly to plasma loss.[2] The evidence in support of the newer views is not yet so complete as to call for desertion of the older conception.

Fortunately, the principles of treatment can be stated with certitude. Coagulation of the injured surface by tannic acid prevents or minimizes the symptoms of acute toxæmia, whether by fixation of toxins or prevention of fluid loss. Those who are content with administration of fluids, on the principle of " neutralizing the toxins," and who omit coagulation treatment, fail to use the most powerful weapon at their command. The importance of administering fluids should not, however, be forgotten. A common recommendation is to exhibit large quantities of alkali. The reason is not clear. There is no satisfactory evidence that any constant disturbance of the acid-base equilibrium occurs in acute toxæmia, and proof of beneficial action of alkalis in also lacking.

Our experience has shown that early coagulation of the injured surface modifies profoundly the clinical course. Acute toxæmia never occurs in a fulminating form, and is almost always absent in burns of small or moderate extent. In cases coming under treatment during the toxic stage the unfavourable signs usually disappear rapidly after coagulation has been secured. Acute toxæmia, even possibly of mild degree, may well, however, determine the issue adversely after severe shock in extensive or very extensive lesions.

Stage 3: *Stage of septic toxæmia.*—The clinical features, pathology and principles of treatment are those of an infected wound.

The results of treatment by coagulation in regard to sepsis are of much practical importance. Formerly, a mild degree of sepsis was common in the tannic-acid method and constituted one of its main disadvantages. Such is no longer the case. In superficial lesions, as, for example, after scalding, sepsis can be almost entirely eliminated by a technique to be described later. In deep burns, however treated, sepsis is inevitable. On that account some authorities recommend treatment of deep lesions by frequent immersion in baths from the commencement. It may be noted that acute toxæmia is often not prominent in deep lesions, no doubt because the skin is completely destroyed and the less vascular deeper tissues have a much smaller area for absorption. Moreover, coagulation affects only a thin surface layer and absorption of toxins cannot thereby be prevented. Treatment by primary coagulation is, nevertheless, preferable. It permits of the more effective treatment of shock, promotes comfort, and allows a period of several days' rest before the battle against sepsis begins. Moreover, the sepsis which occurs in a deep burn so treated is usually associated with constitutional symptoms of surprisingly mild degree.

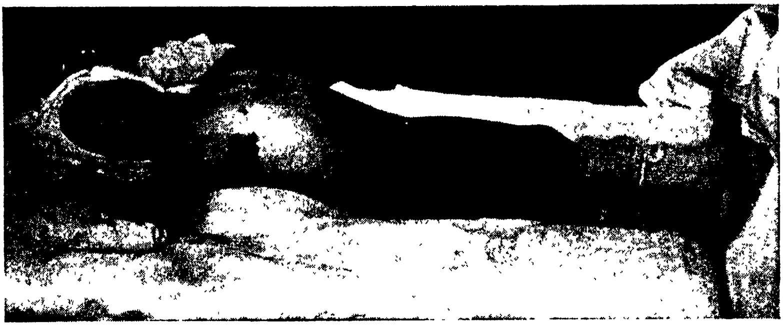

FIG. 1.—Photograph on third day of extensive burns. Acute toxæmia was not marked. Child recovered.

When sepsis is manifest in the coagulation method, the tanned layers must be removed and treatment as for an infected wound be instituted.

Stage 4: *Stage of healing.*—Questions arise at this stage relating to general and plastic surgery of a scope too extensive for this article.

GENERAL CONCLUSIONS IN REGARD TO PRESENT-DAY TREATMENT OF BURNS

The basis of the modern treatment of burns is coagulation of the injured surface by tannic acid. This method has important local and general effects. (*a*) *Local effects:* It is rapidly analgesic. Pain, discomfort and frequent dressings are avoided while the coagulum is present. In superficial burns sepsis is absent and healing is rapid. (*b*) *General effects:* It lessens fluid loss from the body at the burned area. It probably helps by its analgesic effect to combat shock. It prevents or minimizes acute toxæmia, thus affecting the clinical course, mortality and prognosis based on the extent of body surface involved.

Mortality.—The claim previously put forward[5] that the tannic-acid method has reduced the mortality in burns has not been accepted by Donald.[3] He quotes figures from the London Hospital which show an astonishing decrease in the incidence of burning injuries treated at that institution during 30 years, with a corresponding fall in mortality without the use of tannic acid. Our claim for a reduction in mortality by the employment of tannic acid can, however, be fully substantiated. The evidence is statistical and only a few details are given here. It is obvious that experience at the London Hospital is very different from that in Edinburgh. The incidence of burns and scalds treated at the Royal Hospital for Sick Children, Edinburgh, remained fairly steady from 1899 to 1920, since when it has *increased* steadily. There was no marked decrease in mortality for five-yearly periods from 1899 up to 1923 comparable to the fall quoted by Donald. The mean mortality throughout the period was 35·4 per cent. The mortality for the period 1924 to 1930 was 8·9 per cent. The mortality during the six years immediately preceding the use of tannic acid (1920–25) was 22·4 per cent., that during the first five years in which tannic acid was used (1926–30) was 8·7 per cent. The mortality in 1930 was 5·8 and, in 1931, 4·8 per cent. (62 cases).

Prognosis.—The prognosis in burns was frequently judged from the extent of surface involvement. By common consent, involvement in children of one-eighth of the body surface was deemed almost certain to prove fatal. A revision of these ideas is necessary since the use of tannic acid. A burn involving up to one-third of the body surface in children now causes anxiety only in exceptional circumstances. In extensive burns of from one-third to one-half of the surface the condition is usually serious owing to severe initial shock, and in still more extensive lesions recovery is improbable.

Fatalities.—The fatal cases of burns can be grouped as follows :—(*a*) those who die rapidly from initial shock; (*b*) those who make only a partial recovery from initial shock and who die during the toxic stage after a period of continued circulatory depression; (*c*) those who die of sepsis. As a rule, their strength has been exhausted in the previous stages; and (*d*) those who die from complications or from causes unconnected with the injury. Groups (*a*) and (*b*) are altogether the most important. In short, it might almost be said that, at the present time, to prevent death from burns we require only the effective treatment of initial shock.

METHOD OF TREATMENT

The treatment of burns will be described first as regards the management of cases admitted to a hospital or nursing home, where the necessary appliances and skilled nursing are available, and, secondly, as regards treatment in the patient's own home. It is probably unnecessary to emphasize that, if hospital or similar accommodation is available, treatment should be carried out there in the great majority of cases.

This rule should be absolute in the following circumstances :—(1) where the injury is extensive and associated with shock; (2) where the lesion is deep and destructive; and (3) where the burn affects the perineum and nursing management will necessarily be difficult.

Description of treatment at the patient's own home is given for the guidance of the practitioner who cannot call on alternative accommodation, or who undertakes the care of a small superficial burn in favourable conditions.

Management of cases in hospital.—In the case of a burn of small or moderate extent and without notable degree of shock, the patient is put to bed, and the bedclothes are supported by a " cage," which contains electric lamp bulbs or other means of supplying artificial heat, and the area exposed to the air. If pain is severe, morphine or heroin is given.

Cleansing.—The area is cleansed under general anæsthesia. The anæsthetic of choice is nitrous oxide and oxygen, but ether can usually be given with safety. Cleansing is done by first removing all epithelium which is loose or raised by blistering. Special care is necessary to remove any epithelium at the edges which is partially separated. The raw surface is *gently* swabbed, first with ether or alcohol, and then with a 1 in 1,000 corrosive sublimate solution. Vigorous rubbing or scrubbing is unnecessary and harmful.

The coagulating solution is then sprayed over the raw surface from an atomizer of any form and dried immediately by a current of hot air from an electric drier or simply by heat from the bulbs in the cage. Spraying and drying are carried out at intervals of one hour, or less if desired. Seven to ten applications are sufficient in the great majority of cases; rarely more than twelve are necessary. An alternative method to spraying is to cover the area with gauze and to soak this with the solution at frequent intervals, keeping it moist until a coagulum forms. The gauze is then removed. After the coagulum is formed, the parts are kept exposed to the air. In burns of the face and head it is necessary to protect the eyes, nostrils, and auditory meatus with moist wool during the spraying, which is the most suitable method for such lesions.

Coagulating solution.—We have experimented with various methods of inducing coagulation. The following solution is found to be the most satisfactory; it practically eliminates the mild degrees of sepsis previously found in scattered areas and seems also to hasten coagulation. It is an aqueous solution of 2·5 per cent. tannic acid and 1 in 1,000 acriflavine.* Packets of powder are kept containing 7·5 grams of tannic acid and 0·3 grams of acriflavine. A convenient amount of solution is made by dissolving such a packet of powder in 300 c.cm. of warm sterile water. The solution should be made freshly for each case or occasion—not necessarily for each application.

Subsequent care.—No special local treatment is necessary after the coagulum has formed. The area is exposed to the air and can be protected from trauma and soiling by ordinary care. Burns of the perineum are treated with the patient in the prone position or lying on a frame, such as Whitman's, with a space in the supporting canvas opposite the affected part. In uncomplicated cases the coagulum is allowed to separate itself. Frequently healing has become complete by the time it can readily be peeled off. Any raw areas left may be covered with a bland ointment dressing.

Sepsis.—In deep burns the same primary treatment is followed. Towards the end of the second week signs of sepsis under the coagulated layer develop and are most manifest at the edges. It is necessary then to remove the coagulum. Different methods are advised for carrying this out. On the whole, we prefer to do so mechanically by cutting it away with scissors. It is occasionally convenient to remove coagulum together with sloughs under general anæsthesia. Treatment of the area as an infected wound is then begun, by fomentations, antiseptic dressings, and baths.

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* Acriflavine was introduced originally as the result of a suggestion for first-aid treatment made by Dr. S. W. Fisher, H.M. Medical Inspector of Mines.

General treatment.—The supply of fluids is of great moment, especially when treatment is begun during the toxic stage. In the severest cases administration of normal saline by intravenous and subcutaneous routes may be necessary, as well as copious quantities of fluid by mouth and rectum. The necessity for frequent estimation of temperature in infants and young children is not sufficiently realized. It is by no means uncommon in them for the temperature to rise suddenly about the beginning of the toxic stage. Continued application of heat will then cause severe distress, and even possibly lead to a fatality. On artificial cooling the distress rapidly disappears. In infants estimations of rectal temperature should be made every 30 to 60 minutes, and the body temperature regulated accordingly.

Treatment of shock in extensive burns.—Treatment of this condition requires special mention. In shock the first indications are artificial heat, morphia, which seems to have a beneficial action, and fluids. The effect of this treatment is closely observed. If after an hour the systolic pressure remains below the critical level of 80 mm. Hg, or if the pressure, originally above the critical level, fails to rise, blood transfusion or intravenous infusion of gum saline is required. A failure to respond to the last measure is ominous. A very low pressure or a falling pressure may call for intravenous therapy without delay.

Local treatment.—This should be as early as may be feasible, since coagulation helps to combat shock by lessening fluid loss and pain. Local treatment, however, involves factors which may aggravate shock, e.g. general anæsthesia, and, even with the exercise of care, exposure and mild trauma. While the systolic pressure remains below 80 mm. Hg, local treatment should not be instituted, and preferably is delayed until the pressure is above 90 mm. Hg.

Anæsthesia.—Nitrous oxide and oxygen should be used. The anæsthesia need not be deep and cyanosis must be rigidly avoided. A ratio of nitrous oxide to oxygen of 3 to 1 is the highest permissible. Anæsthesia is terminated by giving a mixture of CO_2 and oxygen, or of CO_2 and air, if the necessary apparatus is available. Undue exposure and unnecessary trauma in cleansing are especially deleterious.

The treatment described above is suitable for all types of thermal injuries and also for electrical burns.

Treatment at the patient's home.—The practitioner in favourable circumstances, with the help of a nurse trained in the method, may be able to follow fairly closely the method detailed before for the treatment of small or moderate burns. Otherwise the following plan can be adopted. The area is cleansed in the usual way under anæsthesia. Gauze soaked in the coagulating solution is applied to the raw surface and covered with wool and a bandage. The dressing may be left for 24 hours or renewed at 12 hours. A coagulum forms which can then be dried by exposure to the air for a short time. After the coagulum has formed, it may be exposed to the air continuously if means for its protection are available. Otherwise it should be covered by a dressing of dry gauze and a bandage. Subsequent treatment is as detailed before.

Successful treatment by tannic acid demands interest, care and attention from those who employ it. They will be well repaid by the results.

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Some Recent Advances in Medical Research

IN the January number of THE PRACTITIONER an article appeared summarizing, from the point of view of practice, a few of the more recent advances in medical science. The material in that article was abstracted from papers published in a wide range of scientific literature, with the object of giving the practitioner a brief review of important or promising new studies. With the same object in view, a further series of summaries of recent work is given below.

UNDULANT FEVER

The large number of papers on undulant fever published in Great Britain during the last few years would alone give an indication of its increasing recognition in this country. Yet a few years ago it was generally believed that the disease was, from the point of view of the British practitioner, an interesting but inconsiderable curiosity, almost confined to particular parts of the Mediterranean basin. It was formerly known as " Mediterranean " or " Malta " fever, the latter name being derived from the prevalence of the disease in Malta at the end of the last century. The discoveries by Bruce of the causative organism, the *Micrococcus melitensis,* and by Wright of the presence of specific agglutinins to this organism in the blood of patients and experimentally infected animals, led to the proof by Zammit and Horrocks that the drinking of infected goats' milk was in Malta the principal cause of the spread of the infection. In 1906, an order was accordingly issued to the British forces in Malta,

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This is the second of a series of articles dealing with recent advances in medical research, of which the first appeared in THE PRACTITIONER, January, 1932, cxxviii, 96.

forbidding the drinking of unboiled goats' milk, and since that time the incidence of "Malta fever" in Malta has become almost negligible.

Of recent years, however, attention has been increasingly directed to the possibility that this infection may be the correct diagnosis of some obscure febrile illnesses seen from time to time in many different countries throughout the world. It is now known, as the result of the researches of Evans and Burnet, that the *Micrococcus melitensis*, isolated by Bruce in 1887 as the cause of "Malta fever," is closely related morphologically, culturally and serologically to the *Bacillus abortus* of Bang, the cause of epidemic abortion in cattle. These organisms, now classed under the generic name of *Brucella*, have been shown by recent work in the United States, France, Denmark and this country to be in fact but different strains of a single group and capable of producing identical clinical symptoms in man.

The symptoms and epidemiology of undulant fever were very fully discussed in 1929 in a Ministry of Health report by Dalrymple-Champneys,[1] which included an extensive bibliography of the subject. The main features of the disease, as "typically" seen, are pyrexia of peculiar type, sweating, asthma, joint pains, and enlargement of the spleen. Its most striking characteristics are the long duration and periodicity of the fever. In a "classical" case the course of the disease is "marked by a series of febrile attacks, each of which lasts for one or more weeks, followed by a period of absolute or relative apyrexia of uncertain duration." A number of atypical cases have, however, recently been reported in which the disease has run its entire course without remissions. Considering the extreme "illness" of the patients during the febrile attacks, the disease has a surprisingly low mortality. The average duration of the "typical" illness, including remissions, is about three months, but cases have been recorded in which the disease has persisted for more than a year, to be followed by perfect recovery. In cases without remissions the course is liable to be shorter, averaging about six weeks.

From the practitioner's point of view, the main significance of undulant fever is in relation to the differential diagnosis of the enteric fevers, tuberculosis, malignant endocarditis, rheumatic infection and other conditions associated with continued or remittent pyrexia. It is a disease to be remembered as a possibility before an obscure case of fever is labelled despairingly, "P.U.O." The clinical features of the disease can be quite protean. In fact, the fever of "undulant fever" need not be undulant. Cases with pronounced joint affection have frequently been labelled "gonococcal septicæmia." A case has been described in which successive diagnoses of gonococcal arthritis, influenza, typhoid, paratyphoid, malaria, pleural effusion and pulmonary tuberculosis were made before *Brucella* infection was suspected and finally confirmed. The good ultimate prognosis that can be given in undulant fever, because of its low mortality rate, would itself make its correct diagnosis of more than academic interest, apart from other, such as epidemiological, considerations. Fortunately, the disease can readily be diagnosed by bacteriological means, in particular by a serological test akin to the Widal reaction for enteric fevers. The *Brucella abortus* of cattle, the commonest *Brucella* infection in this country, is strongly agglutinated by the serum of actively infected patients, and the increasing tendency among bacteriologists to include a test against *Brucella* when examining blood-specimens for typhoid has already shown that the former infection is a considerable disease entity in the British Isles.

Much work has recently been done to determine the methods by which undulant fever may be contracted in this country. It is now known that *Brucella* infections may occur in many different animals, including cows, pigs, dogs and horses. Apart from direct contact with an animal harbouring the organism it seems likely that the most ready source of human infection is the milk supply. The *Brucella abortus* is known to persist for long periods in the udders of infected cows, and studies by Smith[2] and by Beattie[3] have shown that in Scotland, at any rate, about 30 per cent. of unsterilized milk samples may contain this organism in the living state. This surprisingly high incidence of milk infection is strangely disproportionate to the number of declared human cases, and further research is necessary to decide what additional factors may contribute to an active human infection.

As stated recently in the *Lancet*,[4] " Our ignorance of the epidemiology of undulant fever calls for intensive inquiry by all types of workers " concerned in the study of infective disease in man and animals. In particular, further extensive examinations of the milk supply in England, on the lines of those made by Smith and Beattie in Scotland, would seem to be urgently called for to determine to what extent this " danger " is involved in the drinking of unboiled cows' milk.

THE TREATMENT OF ADDISON'S DISEASE

A new and promising development of organotherapy relates to the treatment of Addison's disease with extracts of suprarenal cortex. Until recently, it was generally thought that the characteristic symptoms of the disease were caused by deficiency or absence of the medullary secretion of the suprarenal gland and, in consequence, it has hitherto been the custom to treat these patients with injections of adrenaline. The results have been disappointing, though transient benefit has often been recorded.

As the result of the work of Hartman, of Stewart and Rogoff and of Swingle and Pfiffner, there are now strong grounds for believing that the essential "deficiency" in Addison's disease is of the cortex of the suprarenal, as opposed to its medulla. Swingle and Pfiffner[5] showed that it was possible to maintain the life of suprarenalectomized cats for an indefinite period by giving injections of cortex, whereas adrenaline had little or no effect on the survival period. The logical development of these experiments has been the treatment with cortical extracts of Addison's disease in man, and favourable results have already been reported by Rowntree and his co-workers[6] in America, and by Levy Simpson,[7, 8, 9,] in this country.

The last worker recently published[9] an account of six undoubted cases of Addison's disease treated by this means. He used an extract of suprarenal cortex prepared according to the method of Swingle and Pfiffner and almost entirely free from adrenaline. All six patients benefited initially from the cortical extract therapy, though three of them subsequently died from complications of their primary disease. The other three have remained in relatively good health since the treatment was started, i.e. for nine, six and two months respectively, at the time of Levy Simpson's publication. In two of the cases it was recorded that the effect of the cortical extract was " as definite and dramatic as that of insulin in diabetic coma," the patients having been almost moribund before treatment. In the cases which improved under treatment, nearly all the characteristic symptoms and signs of Addison's disease tended to lessen, even the pigmentation decreasing rapidly, though this has not vanished completely from any of the patients observed. The extract of suprarenal cortex was given by injection, intravenously for the first week in severe cases, and intramuscularly afterwards. It was found to be important that the extracts used should be as free from adrenaline as possible, since the intravenous injection of adrenaline might lead to severe reactions. Benham and others[10] have also suggested that a trace of protein in the extracts may be a source of danger. They have stressed the necessity for great caution in giving the extract in its present form, until it is possible to eliminate with certainty all protein and adrenaline and to obtain a reliable method of chemical or biological assay.

At present, it may be said that, considering the inevitably fatal termination of untreated Addison's disease, the results obtained so far with cortical extracts have been distinctly encouraging, but that further research work is necessary to obtain therapeutic extracts which can be used with safety and precision of dosage. It is noteworthy that although, as Levy Simpson says, " clinical experience and general considerations of hormone therapy indicate the necessity for continued administration of cortical extract," in one of his patients good health has been maintained for eight months after the last injection. He considers that this may be due to the fact that the patient is at the menopause, in relation to which a readjustment of ductless gland balance may be taking place.

NUTRITIONAL ANÆMIA IN INFANCY

In a recent report of the Medical Research Council, Dr. Helen Mackay[11] and her co-workers called attention to a common condition of anæmia occurring, but apt to be unrecognized, in infants during the first two or three years of life. This anæmia, like the now extinct chlorosis, has been shown to be readily curable by giving iron salts, though there is evidence that not the iron alone but also traces of other metals (copper and possibly manganese) present in these salts may play a part in the therapeutic effect. Lewis[12] and Parsons[13] believe that copper is an important adjunct to iron in the treatment of the condition, and it is of interest to note that Shelden and Ramage[14] found by a spectographic method that manganese also was a constant impurity in a large number of therapeutic preparations of iron, including those used by Dr. Mackay.

The fact that this condition of "metallic deficiency," besides being, as Dr. Mackay states, the commonest cause of anæmia in infants, may be associated with defective weight, retarded growth, and poor resistance to bacterial infections, makes its diagnosis and prompt treatment matters of the highest importance. The anæmia may develop as early as the third month of life, though there is no evidence that it is ever present at birth. It is specially liable to occur in cases of prematurity. It may affect both breast and bottle-fed infants and, if untreated, it tends to disappear at the age at which the diet begins to contain adequate quantities of iron. It seems to have no connection with rickets, and can be cured without any alteration in the vitamin content of the food.

The condition may sometimes be recognized by the appearance of the child, but the diagnosis must ultimately rest upon a blood examination. Various clinical features are, however, suggestive : these include pallor of the lips, listlessness and abnormal susceptibility to bacterial illnesses. The relation of anæmia to growth is a complex one. While rapid increase in size may hasten the onset of the condition, growth may be retarded in those already affected by the disease.

The blood-picture in nutritional anæmia resembles that of chlorosis, having a low colour-index. The hæmoglobin level in severe cases may be reduced to 30 or 40 per cent.

The development of the disease can effectively be prevented by the addition of iron salts to the ordinary diet, and Dr. Mackay points out that all artificially-fed and many breast-fed infants should have this prophylactic treatment. There is as yet no evidence that giving iron salts to the mother will prevent the development of anæmia in breast-fed infants. Treatment of the infant should begin before the second month of life and should be continuous at least for the first year. A satisfactory iron salt to use is iron and ammonium citrate, which usually, if not invariably, contains traces of copper and manganese. It can be given either as a mixture (1½ grains in 1 drachm of water flavoured with syrup: 4½ to 9 grains daily), or it may be incorporated in the dried milk used for the feeds. The administration of iron in either of these ways should raise the hæmoglobin level in the blood of most infants over five months old to the neighbourhood of 80 per cent. The fact that this simple therapy will lead in very many cases to astonishing increase in the vitality and the resistance to infection of young infants points the way to an easy method of improving the general health of the infant population of the country. There seems little doubt that when the requisite iron ration for babies comes generally to be prescribed by practitioners and welfare centres, the condition of nutritional anæmia will be made, like chlorosis, to disappear.

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Practical Notes

Gastric and Duodenal Ulcer

Richard H. Miller (*New England Journal of Medicine*, May 5, 1932, ccvi, 925) publishes a review of gastric and duodenal ulcer. He suggests that disturbances in the relaxation of the pyloric sphincter (achalasia) probably have a great causative effect, in that such disturbances prevent the normal regurgitation of alkaline duodenal contents into the stomach to neutralize the irritating acid of that organ. This difficulty has been treated by some surgeons by attempting to sever the nerves which cause contraction of the pyloric musculature. The possibility of peptic ulcer being, at least in part, dependent on, or resulting from, an infection elsewhere in the body, is being continually studied, and the finding of the same strains of streptococci in ulcers, as in distant foci, is an observation of enough scientific accuracy and constancy to demand consideration (A. C. Nickel, *Ann. Int. Med.*, May, 1930, iii, 1084). The modern treatment of peptic ulcer includes the removal of all such possible foci. The familial tendency to peptic ulcer is constantly noted, as well as the co-called " ulcer diathesis," or individual susceptibility. In the consideration of ulcer of the stomach the first and most important question to be settled is whether the lesion may or may not be cancerous—whether it is a definite cancer, or whether it is an ulcer which possibly shows the beginning of malignant degeneration. A. G. Brenizer (*Ann. Surg.*, September, 1930, xcii, 367) states that all ulcers in the antrum and body, along the lesser curvature, are benign, and all ulcers outside this zone are malignant; he further states frankly that he is not sure about the percentage of development of carcinoma in chronic ulcers, or whether cancer starts out as pure cancer in the beginning. W. C. MacCarty (*Collected Papers of the Mayo Clinic*, 1930, xxii, 41) finds that the earliest discoverable cancers have been in the borders of chronic ulcers, and that most ulcers of a diameter of 2·5 cm. or more are already cancer. He argues that cancer must develop in (1) normal mucous membrane (a rare occurrence), in (2) a polyp (equally rare), or in (3) a chronic gastric ulcer; the last he considers the most reasonable. In his opinion the great majority of gastric cancers develop in the chronic gastric ulcers, and 10 per cent. of all ulcers are, or will become, malignant. He believes that exploration with resection is a safer procedure than expectant treatment; at the Mayo Clinic the operative mortality is 3–5 per cent., while the occurrence of cancer is 10 per cent. W. C. Alvarez (*Journ. Am. Med. Assoc.*, July 11, 1931, xcvii, 77) notes that most large lesions are malignant, and most small ones are benign, but the point which he emphasizes most strongly is that the radiologist cannot always be sure. As we learn more about duodenal ulcer it is becoming increasingly evident that cases for operation must be carefully selected, and preferably should be those that have definitely failed to be cured after long and careful medical treatment. In this connection D. C. Balfour (*Collected Papers of the Mayo Clinic*, 1930, xxii, 56) says that the duodenal cases which do badly after operation are those who are young, who have no pyloric obstruction, and who have a high degree of hyperacidity; Fremont-Smith and McIver (*Am. Journ. Med. Sci.*, January, 1929, clxxvii, 33) likewise say that the duodenal ulcers of long duration and severe symptoms have better post-operative results. The high acidity is probably what initiates and maintains a peptic ulcer, and it, in turn, is probably caused by dysfunction of the pylorus, which does not relax properly and allow normal regurgitation into the stomach of the duodenal contents, which are more strongly alkaline than any other fluids of the body (R. Ellman, *Surg., Gynec., Obst.*, July, 1929, xlix, 34; J. B. Deaver and V. G. Burden, *Ann. Surg.*, November, 1931, xciv, 818). Any operation to cure peptic ulcer must, therefore, provide for this regurgitation of neutralizing juices, whether through the pylorus or through a new stoma.

Varicose Vein Solutions

N. J. Kilbourne, W. Dodson and A. H. Zeiler discuss varicose vein solutions with reference to toxicity, slough-producing properties, and bactericidal action as related to phlebitis and embolism. The authors state that mercury bichloride and biniodide in the injection treatment of varicose veins have been fatally toxic in three cases. Metaphen is less toxic and is not likely to cause a slough. Experiments on rabbits did not indicate serious danger from toxicity in other solutions tested. Sugar derivatives and sodium chloride are non-toxic and relatively painless. Their use has been associated with an incidence of deaths from infection and embolism not found with quinine-urethane. Unlike quinine-urethane, they are not self-sterilizing or bactericidal. Since they are easily contaminated they should be handled with extraordinary care in technique to prevent infection. The sloughs which they make when injected into the tissues are less serious than the salicylate and quinine sloughs. Sodium salicylate is efficient as a sclerosing agent. It is bactericidal to *Staphylococcus aureus* only in the strong solutions. It may cause a painful cramp after injection, and the sloughs which it makes are more serious than those following dextrose and sodium chloride. Lithium salicylate obviates the pain of sodium salicylate, but is slightly more toxic and is said not to keep well in solution. Quinine-urethane is highly efficient as a sclerosing agent, and even when diluted is bactericidal to staphylococcus aureus. It has a perfect mortality record, possibly due to its bactericidal action in preventing phlebitis and embolism. It may be slightly toxic to occasional patients, and when injected out of the vein does not give the warning of pain given by the other solutions. It causes no pain at time of injection, and if the leg is kept bandaged, the occasional pain the next day is usually prevented. Because of its perfect mortality record the authors regard it in expert hands the solution of choice—except in small superficial thin-walled veins, provided, of course, it is used by those sufficiently experienced not to allow extravascular escape. Sodium morrhuate is not a toxic solution, and if injected into the tissues out of the vein the sloughs which it makes are not so serious as the salicylate and quinine sloughs. It is not bactericidal or self-sterilizing.—(*Surgery, Gynecology and Obstetrics*, April, 1932, liv, 640.)

Inguinal Hernia

John J. Moorhead points out that ever since the word "rupture" was used to denote hernia, there has been a widespread opinion that trauma is the responsible factor in the causation of the condition. He states bluntly that traumatic inguinal hernia is a myth that should be consigned to the museum of historical relics of a bygone era. In the development of inguinal hernia the pre-formed sac is the essential factor, and this is the congenital element of greatest importance. Every inguinal hernia in the adult male has an inherent and inevitable tendency to increase and, sooner or later, may become manifest to the possessor or to the examining physician. Aggravation of the hernia by some form of intra-abdominal pressure can be accomplished if the violence is adequate and the symptoms are appropriate. These symptoms are immediate in onset and consist essentially of pain, nausea, swelling, and local tenderness. Aggravation in reality is less common than is suspected (*a*) because evidences of it are almost never seen in the presence of even severe contiguous injury, (*b*) because at operation there are no local signs of recent trauma, and (*c*) because the pathologic examination also fails to show evidences of recent trauma. A post-operative recurrence rate of approximately 10 per cent. occurs among workmen. Prolonging the period of post-operative convalescence may hinder rather than benefit the patient by inducing muscular atrophy of disuse. The relation of hernia to a given trauma can be proved only by (*a*) the history of intra-abdominal pressure followed by immediate symptoms, (*b*) the operative observations, and (*c*) the pathological report. An isolated or single injury is never the source of origin of inguinal hernia, and aggravation or acceleration by trauma is exceedingly rare.—(*Journal of the American Medical Association*, May 21, 1932, xcviii, 1783.)

The Treatment of Dupuytren's Contracture

A. A. Davis publishes a review of 31 cases of Dupuytren's contracture with an assessment of the comparative value of different methods of treatment. This paper embodies the results of an inquiry undertaken by the writer when Surgical Registrar at the Manchester Royal Infirmary. Although the number of cases may appear somewhat small, it represents the largest series of end-results recorded in the literature of this condition. The cause of the contracture continues to remain obscure, in spite of the multiplicity of theories which have been advanced since Dupuytren (*Journ. univ. et hebd. de méd. et chir. prat.*, 1832, v, 348) first ascribed it to chronic irritation. In considering the question of treatment in general, a review of the literature reveals an almost bewildering variety of different methods. A case recently reported by Trumper (*Lancet*, 1931, ii, 17) appears to have been much relieved by counter-irritation with iodine. He produced a bullous dermatitis by the inunction of the unguentum iodi denigrescens daily for ten days in a case of palmar fascial contracture following an injury, with resulting apparent cure; the permanency of the effect would seem open to considerable doubt, and the fact that the original condition was not a true Dupuytren's contracture somewhat minimizes the value of the observation. Acting on the assumption that the disease is a manifestation of an endocrine disorder, Leopold-Levi (*Bull. Acad. de méd.*, 1913, January 14) and Lennox Wainwright (*The Practitioner*, 1926, cxvii, 263) have used thyroid extract internally, with some degree of success. The former treated seven cases with 10 cgrm. of thyroideum siccum daily, using up to 150 doses in one case; he states five of the patients were somewhat improved. Wainwright, on the other hand, claims excellent results in four cases treated over a period of years with ½ grain of the extract daily. The author comes to the conclusion that mechanical methods of treatment, including fibrolysin and radium and X-ray therapy, are useless, with the proviso that further experience may conceivably make radium a safe and effective cure. Operation of some type remains the method of choice in treatment. It is suggested that as the results from even the most major operative procedures are far from satisfactory, the minor operation of multiple subcutaneous fascial division should be adopted, and repeated if necessary, in the average patient of the hospital class. In patients of the more leisured class, wide fascial excision with replacement of involved skin by a free full-thickness skin-graft is probably most advisable, combined, if necessary, with Hutchinson's operation. Where the best cosmetic result is desirable, e.g. in non-labouring women and in men of the professional classes, Thiersch grafts may be substituted for the thicker full-thickness one. Implants of fat or fascia are theoretically undesirable, and have not been uniformly successful in application.—(*British Journal of Surgery*, April, 1932, xix, 539.)

The Treatment of Dysmenorrhœa in Young Girls

J. de Manet, who is assistant obstetrician to the Hertford British Hospital, Paris, points out that while dysmenorrhœa in adult women is usually caused by a definite lesion which requires the intervention of the surgeon, in young girls, on the other hand, dysmenorrhœa usually exists without any lesion and is purely functional. Between the ages of 13 and 16 the genital organs develop rapidly and acquire in a comparatively short space of time new characteristics which enable them to fulfil their function of reproduction. One type of dysmenorrhœa may be described as obstructive or mechanical, and in this type there is usually present stenosis of the cervix uteri or some malposition of the uterus, especially congenital anteflexion. Ovarian dysmenorrhœa is of quite a different type and precedes the onset of menstruation by some days; after menstruation begins the pain rapidly disappears. A rarer type is membranous dysmenorrhœa, when at each menstruation there is a massive exfoliation of the uterine mucosa; the pain comes on before menstruation and lasts until the membrane has been expelled. As regards treatment, the author recommends the administration of ovarian extract, alone or combined with thyroid extract or pituitary extract or both. Rest in bed is a necessary part of the treatment of dysmenorrhœa, and tepid baths have an excellent sedative effect. Analgesics and antispasmodics (such as antipyrin and aspirin) are useful at the crisis of the pain.—(*Gazette des hôpitaux*, June 4, 1932, cv, 856.)

Reviews of Books

Recent Advances in Pathology. By GEOFFREY HADFIELD, M.D., F.R.C.P., and LAWRENCE P. GARROD, M.B., M.R.C.P. London: J. and A. Churchill, 1932. Pp. x and 392. Illustrations 67. Price 15s.

THIS addition to the successful "Recent Advances" series, which now numbers twenty-five, is, it may at once be said, an admirable and much needed work, for it is on the practical lines of dealing with pathology as an essential part of medicine and not as an abstract branch of science. The scope of such a survey is immense, and some aspects of pathology, such as hæmatology and bacteriology, which are considered in other volumes in this series, are omitted; but the blood-forming organs are not entirely excluded, for sphenomegaly and the effects of irradiation on the blood are considered. Other subjects, for example, syphilis, tuberculosis, lymphadenoma and jaundice, are not dealt with in special sections. Each subject is provided with a select bibliography, and the amount of literary research that the authors have undertaken is remarkable; for example, the section on Bright's disease shows that the recent monographs have been studied and their conclusions critically assimilated and blended. The large subject of cancer, and especially its experimental production, receives ample attention, and a chapter is devoted to therapeutic cancer research. Vitamins and the affections of the endocrine glands, like, in fact, the subjects in the remainder of the book, are summarized in a thoroughly up-to-date manner. Under the heading of pneumonia its serum treatment finds a place. The present views about primary malignant disease of the lungs are given, and illustrations of asbestos bodies occupy a full page. The illustrations are excellent, especially, perhaps, in the section on Bright's disease.

A Textbook of Surgical Pathology. By CHARLES F. W. ILLINGWORTH, M.D., F.R.C.S.E., and BRUCE M. DICK, M.B., F.R.C.S.E. London: J. and A. Churchill, 1932. Pp. 670. Figs. 290. Price 36s.

To the graduates and senior students to whom this work is addressed we commend it as one that at last satisfies a need of long standing, for to these two Edinburgh surgeons we are indebted for a valuable contribution to textbook literature. To those familiar with surgical publications the words "surgical pathology" may form a sometimes sinister conjunction, connoting the facile and the opportune, but not always the basic truth. Here, however, is a combination of uniform soundness with the up-to-date and modern expressed with a clarity and simplicity that make the book, once opened, hard to lay aside, and we believe it will have a wider appeal than that modestly claimed by the authors. They are in truth writing of surgical disease rather than of morbid anatomy alone, but basing their thesis continually upon pathological processes they achieve a connected whole at once logical and devoid of the empirical. Appendicitis is well described, due stress being laid upon the obstructive factor in its etiology, though we should have liked to see some mention of the bacteriology, and regard as a serious omission the absence of any reference to associated intestinal obstruction. The work of one of the authors on the formation of gall-stones has added to the value of a very illuminating chapter. The modern development in calcium metabolism and the parathyroid hormone are well and clearly described. In the vascular section the account of the endotheliomas is sketchy, and the attribution of the discoloration associated with traumatic asphyxia to ecchymosis will not find universal acceptance. The print is clear and pleasing and the form spacious and distinguished. The illustrations, however, especially in view of the name of the publishers, are somewhat disappointing—it would have been better, for example, to have reproduced the skiagrams from the original films rather than from prints.

A Guide to General Practice. By A. H. DOUTHWAITE, M.D., F.R.C.P. London: H. K. Lewis and Co., Ltd., 1932. Pp. vii and 96. Price 4s. 6d.

THIS handy and pleasantly written guide by a consultant who had five years' experience of general practice before he became assistant physician to Guy's Hospital, is an expansion of three lectures on general practice delivered last year. It is full of sound advice and should be read, inwardly digested and assimilated by every man before going into practice and partnership so as to avoid financial catastrophe. Partnership is recommended in preference to "squatting," full information is given about the articles of partnership, and a warning is thrown out against accepting the suggestion that such an agreement is unnecessary because "we are both of the same hospital. Why waste money on legal procedure when we who worked in the same school can obviously trust each other?" The remarks on what is commonly spoken of as professional etiquette or ethics are shrewd and valuable.

Fraud in Medico-legal Practice. By SIR JOHN COLLIE, C.M.G., M.D. London: Edward Arnold and Co., 1932. Pp. xi and 276. Figs. 47. Price 11s. 6d.

THIS authoritative work is based on the second edition, now out of print, of the author's well-known book on *Malingering*. Needless to say it is the outcome of long and exceptional experience and convincingly impresses the reader with the logical method of arriving at sound conclusions and the value of a highly-developed degree of practical psychology. An attractive feature is the way in which important points are carried home by the introduction of appropriate anecdotal cases. The modern prevalence of fraud in medico-legal practice is traced to the Workmen's Compensation Act and to the Trades Unions and other clubs. In the past the detection of malingering was mainly needed in the fighting services, but it now concerns panel and other practitioners. Much valuable advice is given to the medical witness, for example, not to trespass upon the legal aspect of the case, for the question of liability is one for the lawyers; and particular attention may be called to the chapter on "The law of libel and the medical witness," a subject on which the information rests not only on the author's extensive experience, but is also fortified by consultation with the legal profession.

Medicine and the State. By SIR ARTHUR NEWSHOLME, K.C.B., M.D., F.R.C.P. With a Foreword by WILLIAM H. WELCH, M.D., LL.D. London : George Allen and Unwin, Ltd., 1932. Pp. 300. Price 7s. 6d.

THIS is a critical summary of the three volumes of international studies made in Europe on the relation between the private and official practice of medicine, with special reference to the prevention of disease, by Sir Arthur Newsholme for the Milbank Memorial Fund of New York. Sir Arthur, who was the last Principal Medical Officer of Health of the Local Government Board before it was, in 1919, merged in the Ministry of Health, was for two years before he began, in 1928, the international survey in Europe, attached to the new School of Hygiene and Public Health of the Johns Hopkins University, Baltimore, as Lecturer on Public Health Administration. But with all his experience he is very chary in suggesting the application of any developments of European medical practice to the circumstances of the United States of North America. He is solely responsible for the contents of the present volume, which is largely based on the information collected in the three previous reports, but also contains a number of opinions essentially controversial. While taking a broad outlook special attention is paid to the various developments, agencies and tendencies which have caused friction between private practitioners and public health authorities. The first of the three parts into which this work is divided deals with general considerations bearing on medical care, the machinery for securing the prevention of disease and its cost, domiciliary medical care of the necessitous, hospitals and medical care and the relation to private practice, and insurance for medical treatment. In the second part an outline description is given of the medical care of motherhood, childhood and youth, and of the prevention and treatment of tuberculosis and venereal disease. The third part contains a number of thoughtful and critical essays on the relation between hospital authorities, public health authorities and insurance authorities respectively and private practitioners, as bearing on the future of private practice. The obstacles to progress in medicine are philosophically considered, and in the penultimate chapter on medicine and character he has no fear about the final outcome of the struggle between individual interest and communal welfare.

THE PRACTITIONER

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A Plea for Periodical Examination to Reduce the Mortality from Cancer

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IF the Registrar-General's Reports for 1930 are carefully considered it will be seen that one in every six deaths over the age of forty is due to malignant disease, that is to say there are in England and Wales more than 55,350 deaths each year due to cancer. Moreover, it will be noticed that every year the number of deaths recorded is increasing, but whether this is a true increase in the incidence of the disease, or merely due to such factors as the increase in population, the increase in the age to which people live, and also the more accurate diagnoses that are made, is not easy to determine. What, then, is being done to lessen this appalling mortality, which is not confined to any one country? It is true that great efforts are being made towards finding out the etiology of the disease, and much work has been done in discovering the best treatment, but the efforts to find a method for detecting the disease in its early stages are very sporadic and totally inefficient. It is, however, on the early diagnosis of the disease that any hope of success depends, and yet up to the present time the subject has been very little ventilated in public. It is well, therefore, to examine the causes leading to this very unsatisfactory state of affairs.

When Nature inflicts a disaster on the individual the mind seeks protection by becoming a blank and refuses to grasp the situation. What is true of the individual is true of the community. The community as a whole has made up its mind that cancer is incurable and unavoidable, and it should therefore be cut out of everyone's thoughts and made a "taboo" subject. A great many people will not even mention the word Cancer, and its unfortunate victims ask their friends not to noise it abroad, almost as if it were something unclean and to be ashamed of.

If it were true that cancer is incurable, then there would, indeed, be a very strong argument for encouraging the idea that it should be a "taboo" subject and that any unfortunate patient suffering from it should be segregated at once from the rest of the community, so that the psychological influence of the disease should as far as possible be removed. The fact, however, that cancer in its early stages can be cured at once negatives the above proposition. The evidence that it can be cured if treated at this stage is overwhelming. Take, for instance, the Ministry of Health Report on Cancer of the Breast (Circular 716, 1926, page 9): "It was found that of patients subjected to early operation, i.e. before the disease had extended beyond the breast itself, 94 per cent. were alive and well at the end of three years, 91 per cent. at the end of five years, and 87 per cent. at the end of ten years."

In a Report on Malignant Disease of the Uterus, No. 40, 1927, it is stated that the five-years' survival rate (by radiotherapy or operation) taken from the results given by a number of clinics, is approximately 36 per cent. The survival rate figures in certain clinics are very much higher. In the Report on Cancer of the Rectum by the Ministry of Health, No. 46, it is stated that 44·7 per cent. have a survival rate of three years or longer. These figures are again taken from a large number of clinics, and individual statistics show very much better results.

It is equally certain that the earlier the disease is discovered the greater the chance of cure, and this is more true of malignant disease than perhaps of any other ailment. In all bacteriological invasions of the body and, indeed, in a great many other conditions, the body has a resistance which increases up to a point with the duration of the disease. In the case of malignant disease, however, if there is any resistance at all to the disease, the evidence goes to show that such resistance is diminishing from the very first. In the late stages of the disease, not only is it impossible for it to be eradicated because of the multiple foci throughout the body, but there is some evidence that the local growth itself is more resistant to treatment such as irradiation.

It will be seen, therefore, that in the present state of our knowledge the whole chance of success, whatever the treatment employed, depends entirely on early diagnosis, and although this is well known to every medical man, yet as mentioned above, nothing is being done on a large scale to bring about the possibility of the recognition of the disease in its early stages. In a Report issued by the Ministry of Health (No. 66) it is stated that only 50 per cent. of patients suffering from the disease seek medical advice in a sufficiently early stage of the disease to have any proper cancer treatment, such as irradiation or operation. In the Report on Cancer of the Uterus already referred to, it is stated that on an average a period of six to nine months is allowed to elapse between the first occurrence of symptoms and the patient's attendance at hospital, and in the case of cancer of the rectum on an average a period of twelve months is allowed to elapse between the first slight symptoms of the disease and the patient's coming to operation.

Why does this state of affairs exist? It is sometimes suggested that it is due to the imperfect training of the medical practitioner. This is most certainly not the reason why patients come for treatment when the disease is so far advanced. It is a common experience of surgeons at a hospital, particularly of gynæcologists, to receive a letter from a practitioner saying: "Mrs. X consulted me for the first time two or three days ago, when I found she was suffering from advanced malignant disease." Sometimes they mention that in spite of the fact that they have been attending the case for various minor ailments, yet the patient omitted to mention a symptom which would at once suggest to the medical man the necessity for further examination. It will be seen, therefore, that in the majority of cases the practitioner is in no way responsible for the late diagnosis of the disease.

The evidence, indeed, is overwhelming that the fault lies with the patient, and there are two reasons for this state of affairs. The first of these is psychological, namely, *fear*, and is very difficult to contend with. The existence of this widespread dread of cancer is sometimes denied by medical men, on the grounds that if it existed more people would talk about their fears, and in point of fact very few patients do. This is an entirely erroneous argument, as those who do speak of it openly are just the people who have to some extent overcome their dread of the disease, whereas the majority of patients go to their doctors and dare not mention the subject.

It is within the experience of every practitioner that patients come to them complaining of indefinite symptoms in the hope that a reassuring negative answer will be given concerning the existence of cancer. If the practitioner suspects the real trouble, namely, dread of the disease, a casual remark to the effect that there is no cancer or tumour present brings such obvious relief to the patient that the real cause of the visit is at once evident.

In a great many cases, however, the true reason for the visit is not suspected, and the patient is given a tonic and some general words of encouragement, which leaves him a victim to the same haunting fears. Unfortunately also it not infrequently happens that if he is brave enough to state frankly the reason of his visit, he is told " not to be so foolish " and advised to forget about it and not be fussy. Could any treatment be less likely to help the wretched patient?

It does not require much imagination to realize why this fear is so widespread. A short time ago inquiries were made as to where patients went to during the last months of their lives, and it was ascertained that the majority returned to their homes. In these homes they are waited upon and nursed by their own relatives. Is it to be wondered at that these latter worry lest they themselves are to fall the next victims to a disease which appears " from the blue " and ends with such horrible pain and misery? Every year adds another 55,000 families to the list of those who have undergone this experience and when any of them summon up courage to see a doctor and ask if there is any sign that they themselves have it, they are often met with the well-meant remark: " Don't be so foolish—why should you have it? "

The second reason for delay in seeking medical advice is the fact that in the majority of malignant conditions there is no pain or urgent symptom until the disease has reached an advanced stage. Having once realized that these are the two main factors which prevent any great improvement in the ultimate results of treatment, it is essential that a national effort should be made to overcome them.

There can be only two methods by which earlier diagnosis may be obtained, namely, to teach the public the slight symptoms that may arise in the early stages, but in fact are very often absent, or to encourage the periodic inspection of the fit. Even if the first of these methods were possible, namely, to educate the masses concerning symptoms, would it be desirable ? Is there not a real danger of people thinking too much about whether they have the symptoms, and if they have them, coming to a wrong conclusion, i.e. that they are suffering from the disease, and thus becoming confirmed neurasthenics ? Imagine the result of such knowledge on the mind of one of these pseudo-medical students, who notices that he is suffering from the very distressing but almost universal complaint of hæmorrhoids. He remembers that a certain leaflet says hæmorrhoids are present in cancer of the rectum. Next day they have disappeared, a few days later he thinks he has some, but is not sure. Can any better method be devised for creating a nation of neurasthenics ? To discuss symptoms individually with the more intelligent patients may and does do a great deal of good, but to broadcast symptomatology to all and sundry can only do a great deal of harm.

It remains, therefore, to encourage periodic visits for inspection of the fit. What are the pros and cons of such a proposal ? The immediate result of such an endeavour would be to relieve the minds of thousands of people who fear the disease but will not approach a doctor for fear of being laughed at. If proper observations and records are made at such visits it will materially advance the knowledge of " precancerous " conditions and will bring to light the existence of a great number of early malignant growths.

What then are the possible objections to such a scheme ? At first sight such a proposal as that advocated would seem so revolutionary as to be impossible of attainment. It is suggested that no individual would go to a doctor when he was feeling hale and hearty. This objection, which sounds so reasonable, is not borne out in the case of periodic visits to the dentist, which are undertaken by quite a large number of the community. Again, thirty years ago the idea of ante-natal care and examination would have been considered quite impossible. Does anyone suggest at the present day that there is any expectant mother who would refuse such an obvious precautionary measure? Why, then, should not periodic overhauls to exclude cancer be equally possible?

Turning now to the so-called practical objections to the scheme, it may be said that the average person has not got sufficient means to afford such visits to the doctor. If there is really a large section of the community in such a poverty-stricken condition, then diagnostic centres, connected with the larger hospitals, would be no more expense to the nation than the nursing of moribund patients suffering from the disease.

Again, it has been suggested that only a minority of the general practitioners are competent to make a diagnosis of malignant disease in its early stage. In the scheme suggested, however, they are not asked to take on such a responsibility. General practitioners are only asked to say whether a certain organ—tongue, breast, cervix or rectum—is *normal*, and if found to be in any way abnormal, to send them on to a hospital for definite diagnosis. One of the most hopeful signs of the times is the increase in cases sent up on suspicion.

It will be seen from the above that the early diagnosis of cancer must depend largely on the medical practitioner. It must be admitted that it is not easy for a busy practitioner, who only sees on an average two or three cases a year, to become interested in a suggestion which at first sight sounds so revolutionary, but there can be no doubt that if he thinks about the matter and realizes that the success of this scheme means that the five-years' survival rate will go up by leaps and bounds, then the whole-hearted co-operation of the profession is assured.

The Surgical Aspect of Toxic Goitre

BY JOHN B. HUNTER, *M.C.*, M.Ch., F.R.C.S.
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THE thyroid gland and its pathological and physiological disturbances have of recent years been the subject of numerous investigations. It is well known that some enlargements of the gland are associated with general disturbances, which affect other systems in the body, such as the cardio-vascular, nervous and intestinal systems. Whether this is due to an increase in thyroid secretion or to some abnormal secretions poured out by a diseased gland, and whether the primary condition is in the thyroid, or that the thyroid state is secondary to some other process occurring elsewhere in the body, our knowledge at present does not permit us to state; but one fact is clear, that the limitation of the secretion of such a diseased gland either by medical treatment or surgical removal of the gland produces an amelioration of the symptoms and signs that amount in a large number of cases to a cure of the disease.

Toxic goitre is most commonly found in women, and can be definitely placed in two classes, the first in which there is a sudden enlargement of the gland, accompanied by other symptoms and signs such as tremor and tachycardia, and later exophthalmos. This type used to be spoken of as exophthalmic goitre, but is better classified as primary toxic goitre. It occurs chiefly in young women who are usually doing some type of mental work, commonly secretarial or teaching. The onset is sudden, and a careful inquiry into the history will usually elicit a story of some mental shock of a severe character. The examination of such a case reveals a moderate but very definite soft enlargement of the whole thyroid gland, with excess of arterial pulsation, especially at the upper poles. The patients' general condition is characteristic, they are restless, moving both eyes and body in rather jerky movements; if seen in bed the clothes are thrown down from the upper part of the body, with arms and neck exposed, and if clothed and sitting up are constantly throwing back their coat from the upper part of the neck and shoulders as though to get more air. The skin is damp and acting freely, the pulse is rapid and there is a tremor of the outstretched hands, with a finer tremor of the tongue.

In early cases the patient is usually well covered, but in cases of some standing marked wasting occurs. As the disease progresses the gland tends to get smaller and firmer and the general toxic symptoms more marked, and the case may end fatally from the breakdown of any of the systems involved, failure from a fibrillating heart, acute mania from a toxic nervous system, or asthenia from diarrhœa and vomiting. In the absence of a fatal termination the disease may burn itself out leaving behind a wreck, whose only existence must be that of an invalid.

A disease with such possibilities for disaster must clearly call for early diagnosis and treatment, and I propose only to deal with the surgical aspect, which experience shows holds out the best hope for the quickest return to a normal state. The surgical approach to such a case necessitates in the first place complete rest away from the home or business environment; it is not possible to say what length of time will be necessary before operation. A careful watch is kept on the pulse-chart, and on the general behaviour of the patient as regards nervousness and weight, and at this stage a mild sedative should be administered. Careful note of septic foci is made, and if any are present they should be removed. Septic tonsils are very common in this disease, and should be removed before the major operation. Although we have no real evidence that the disease is caused by sepsis, the removal of septic tonsils frequently produces marked improvement in the patient's condition. When the pulse-rate after a period of rest has remained constant for several days the time has arrived to consider surgical interference. The patient is then given a course of Lugol's iodine, starting with two minims three times a day and working up to seven minims. It is found that in the majority of cases the day on which the maximum benefit is obtained, as judged by the pulse-chart, is the tenth day. If the Lugol's solution is continued over that day the pulse-rate does not decrease, and frequently increases.

The benefit of the iodine is apparent from the first, the pulse steadies, the patient is calmer, and the gland itself usually decreases slightly, becomes firmer on palpation, and the surface instead of being smooth has a finely granular feeling. If the patient has had iodine at any time the benefit from the pre-operative course is usually not so marked; in some cases where iodine has been freely administered beforehand the pulse-rate starts to go up with the pre-operative course, and if the treatment is stopped the pulse falls again. This type of case is best treated surgically after prolonged rest, and even then these patients have very unequal pulse-charts, tachycardia being produced by the slightest untoward event.

SECONDARY TOXIC GOITRE

The second class of toxic goitre occurs in older women commonly about the menopause or a few years after it. It differs from the first in an essential point, that the thyroid has been the seat of some previous disease for some years before the onset of toxic symptoms. The previous swelling of the gland is usually adenomatous, and on this account is sometimes called a toxic adenoma, but as the previous swelling may be a colloid goitre, a better term for this superimposed disease is secondary toxic goitre.

These patients again differ from the primary in that they are thin people and do not usually have exophthalmos. All the other toxic signs are, however, present and may be as severe, and in some cases more severe than the primary type. The clinical signs in the gland vary considerably from a small localized adenoma to a general large colloid goitre, but even in the case of the small adenoma some increase in the size of the gland can usually be discerned. These secondary toxic goitres offer a much more difficult problem than the primary type. The patients have known of the swelling in the neck for many years, and are unwilling to allow that the general symptoms, nervousness, palpitation and so forth, have any connection with the thyroid enlargement, and have probably been warned at some time against an operation on the gland.

The pre-medication of these patients is similar to that of the primary type. A period of absolute rest is essential, and further these patients feel more unwell than the others, and are likely to have periods of depression, which must be guarded against, and septic foci should again receive attention. The exhibition of Lugol's iodine has a definite effect, but not so dramatic as in the primary cases, the pulse-rate usually steadying rather than dropping as in the latter cases, and in some the iodine has apparently little or no effect.

Both these types of thyroid disease have an increased basal metabolic rate, as is shown clinically in their moist hot skin, flushes, and desire for cool air, but its measurement should be reserved for those obscure cases where a diagnosis is in doubt, as the manipulations necessary for its determination worry the patient and increase the tachycardia.

The pre-medication period being over, the patient is now in the best condition for operation, and the question of anæsthesia has to be considered. The immediate pre-operative preparation is a considerable strain on these toxic patients, and it is frequently found that a patient's pulse-rate, which has been quiet over a period of days, suddenly rises by thirty or forty, a fact that adds very considerably to the operative risk; the anxiety period can be greatly reduced by some pre-anæsthetic medication. Avertin or some other hypnotic is a satisfactory method of overcoming this difficulty, and even the unusual procedure of the passing of a rectal tube can be in part overcome, by giving small rectal salines for some days before the operation.

After the administration of avertin the operation can be performed with the addition of a light ether anæsthesia or with novocain, if the case has a fibrillating heart local anæsthetic should always be used. In a certain number of cases even these precautions are unavailing and the pulse-rate rapidly rises to 180 or even 200, and when this occurs the patient should be returned to bed and the operation postponed.

The details of the operative procedure need not be discussed here, with the exception of the amount of gland to be removed. This is a difficult problem, no fixed numerical amount can be stated, each case being dealt with at the time. Those cases that have reacted well with Lugol's iodine are apparently cases in which an involution process is rapidly produced in the gland, and it is possible that in these cases the removal of too much thyroid, together with a subsequent involution in the remaining glandular tissue, may produce a mild degree of myxœdema. This myxœdema, if occurring, can be controlled by thyroid extract, but it is doubtful if this is altogether satisfactory. Those cases therefore which have given evidence of marked involution changes under iodine treatment probably require less gland removed than the cases where iodine has produced little or no improvement. The gland itself, when cut across at operation, also gives some indication as to the amount of involution that has taken place under iodine treatment; this is more easily noted in the primary toxic cases, the involuted gland having much more colloid and the beefy appearance of the untreated toxic gland being absent.

These considerations should help us at the time of operation, but nothing can be more disappointing than to find from the subsequent clinical picture that too little gland has been removed, and in the present state of our knowledge it is as well to err by removing too much. In those cases of secondary toxic goitre with a single adenoma, it must be remembered that the removal of the adenoma is not sufficient, the rest of the gland is almost certainly the seat of hyperplasia, and must be dealt with in a similar manner to the primary condition.

Immediately after operation these patients are inclined to be restless, and it is most important that this should be controlled. It is best done by frequent small quantities of morphia, which not only keep the patient quiet, but ease the tracheal irritation from which most of them suffer, and the day after operation a fresh course of Lugol's iodine is started. With the greatest care, before, during, and after operation a certain number of cases continue to have a mounting pulse-rate, and in some cases a mounting temperature. In such patients iodine medication must be pushed, if there is no vomiting it can be given by mouth, if there is vomiting it should be given by the rectum, subcutaneously or intravenously, depending on the condition of the patient. This is combined with glucose saline and more frequent morphia injections.

The subsequent convalescence in the ordinary course should be prolonged, six months' further rest after the operation should be insisted upon, and no patient should be allowed to return to their normal activities without being re-examined.

The Medical Treatment of Graves' Disease and Toxic Goitre

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IT is mainly the custom to regard Graves' disease and hyperthyroidism as practically synonymous. If this conception is correct the problem is simple; there is too much thyroid, remove some. When it was demonstrated that the symptoms of Graves' disease could not be entirely reproduced by administering large doses of thyroid extract, the conception of dysthyroidism arose; this considered the condition to be due to too much of an abnormal secretion. This has something to be said for it, as will be noted below. But as there are only two substances which counteract the toxicity of acetonitrile, normal thyroid extract and the blood of cases of hyperthyroidism, we have to agree that hyperthyroidism is actually present. It is customary to regard Graves' disease and toxic goitre as two separate syndromes, chiefly from gross morphological and regional considerations. But as regards the metabolic standpoint, and, as I hope to show, the results of medical treatment, there are no differences. In this article Graves' disease and toxic goitre are classed together as severe hyperthyroidism.

My active interest in this problem arose after the influenza epidemic of 1918; I reported that typical cases of severe Graves' disease were not uncommon as a sequel,[1] and noted that milder grades were quite frequent. It may be observed that the recent epidemic of influenza is also causing hyperthyroidism; two such typical cases have been seen within the week of writing this. At about the same year, McCarrison's observations and experiments in the Himalayan foothills were published—how by polluted water and by fæcal cultures he could produce goitre at will.[2] Since, to my mind, goitre, toxic goitre and Graves' disease appeared to be closely related, it appeared to be of interest to try whether dietetic measures could favourably influence the course of the disease. If an enteric infection was the root cause, then an alteration of the condition of the intestines might alter the bacterial flora; so I began to treat these cases with a high carbohydrate diet in 1919. This diet rigidly excluded milk and all milk products except butter, eggs and all animal proteins; the patient was encouraged to eat largely of fruits, vegetables, starches and sugars. By this means it was hoped to get a shift in the enteric p^H and an alteration of the flora. The result was good, the patients responded favourably, but the explanation is probably quite different from that postulated at first; such a diet is calculated to help in the disordered metabolism of hyperthyroidism in another way.

To return to pathogeny; excess of thyroid extract will not produce all the symptoms of hyperthyroidism; it will not produce the exophthalmos which gives a synonym, exophthalmic goitre. In order to obtain exophthalmos, an excess of adrenaline must be added to an excess of thyroid extract; by this means the condition of myxœdema has been converted to that of Graves' disease.[3]

Exophthalmos is treated on the Continent by yohimbine; yohimbine acts somewhat like nicotine, by paralysing those myo-neural junctions which are acted upon by adrenaline. Thus, to hyperthyroidism we have to add hyperadrenalism, an excess of the medullary adrenal hormone. Yet Cramer and others postulate the adrenal as restraining the thyroid; a good discussion is given by Langmead.[4] Cramer suggests that Graves' disease is due to a breakdown of the adrenal cortex restraint on the thyroid. Thyroid feeding in animals is followed by hypertrophy of the adrenal cortex; there is an increase of the basal metabolic rate and the thymus hypertrophies after adrenalectomy—constant findings in hyperthyroidism; depressive X-radiation of the adrenals has been employed therapeutically in hyperthyroidism.[11] We must conclude that there is an excess of the medullary adrenal hormone, and postulate that this medullary stimulation is followed by, or is due to, a diminution of cortical activity which normally restrains thyroid function. Marine has shown that treatment of hyperthyroidism with the recently discovered adrenal cortex hormone is of benefit.[5]

Another possible factor, the metabolism of the muscles, should be considered. Zondek[6] has shown that normal muscle in alkaline Ringer solution takes on a metabolism similar to that of muscle in hyperthyroidism; in acid Ringer solution the metabolism of myxœdema was noted. In both cases the addition of small amounts of iodine counteracted these changes, and brought the metabolism to normal. Hyperthyroidism might also be regarded as due to some toxic factor altering muscular metabolism and requiring a greater output of iodine from the main iodine depot—the thyroid gland.

There are one or two other aspects of this abnormal thyroid activity and iodine metabolism which deserve notice. Abelin[7] has shown that the thyroid normally produces two iodine-containing substances—thyroxin and di-iodo-tyrosin; thyroxin alone increases the basal metabolic rate and depletes the liver of glycogen; di-iodo-tyrosin has no action alone, but when added to thyroxin it lessens, or prevents its action, depending upon the amount. He found that rats, fed on large doses of thyroid, showed signs of hyperthyroidism; di-iodo-tyrosin administration was followed by a depression of the basal metabolic rate; continuous administration of a diet rich in carbohydrate and vitamins, poor in all proteins other than casein, gradually reduced the basal metabolic rate and the symptoms to the normal, although the administration of thyroid was continued. He states that di-iodo-tyrosin is beneficial in Graves' disease, but gives no case notes. Abelin appears to have given some proof that dysthyroidism is present in hyperthyroidism; that the condition is due to a lack of the normal restraint of di-iodo-tyrosin. Also it raises the possibility of hyperthyroidism being a disorder of tyrosin metabolism, for adrenaline, thyroxin and di-iodo-tyrosin are all abnormal in amount in Graves' disease, and all are tyrosin derivatives. The most important point in this work is the observation of the value of diet.

Then Schittenhelm[8] has shown that the blood iodine is high in hyperthyroidism and low in myxœdema; that injection of adrenaline causes the blood iodine to rise in both conditions. He found that the blood iodine was increased by adrenaline even after complete thyroidectomy, so that other iodine depots than the thyroid must be present. These were found to be in the mid-brain, especially the tuber cinereum—the part most intimately related to the activity of the endocrine glands. In animals fed on thyroxin the iodine content of this part rose considerably; in sub- or a-thyreosis the values were much less than normal. He considers that hyperthyroidism may be due to an abnormality of the mid-brain, whereby an increased amount of iodine is taken up; this leads to hyperactivity of the centres controlling endocrine function, and thus a vicious circle originates. He states that X-radiation of the tuber is useful in treatment. Closely related to this is an observation on excessive fluoride medication in man; this may lead to a transient diabetes insipidus.[9] Crew and Wiesner have recently demonstrated a thyroid-stimulating substance in the pituitary.[14] Thus, fluoride might act by depressing these hyper-active mid-brain centres.

We do not yet know the exciting cause of hyperthyroidism, but we do know that infections, pre-existing goitre and emotion are important. We know that as a result of these unknown causes the thyroid and the adrenal medulla secrete more hormone than normally; that muscular metabolism is altered inasmuch as more oxygen is required and in spite of this, more lactic acid is produced; that the iodine of blood and tissues is increased. How these changes can produce some of the symptoms of hyperthyroidism must be considered, and especially the metabolic changes must be examined.

Both thyroxin and adrenaline stimulate the liver to break down glycogen, liberating glucose in the blood; in addition they appear to prevent ready re-synthesis of lactic acid to glycogen. Thus, hyperglycæmia follows and glycosuria is frequent. Some cases are only with difficulty distinguished from diabetes mellitus. Glucose is thus wasted; still more important is the action of the hyperglycæmia in depressing insulin production. Before the isolation of insulin the object of treatment in diabetes was to keep the blood-sugar below 0·180 per cent., for values above this led to failure of insulin production, and, therefore, failure to utilize glucose. This is the real explanation of the insulin treatment of hyperthyroidism; it is of value, but frequent injections are not desirable in such apprehensive patients.

This action on carbohydrate metabolism and the similarity of diabetes and hyperthyroidism as regards wasting, thirst, bulimia, glycosuria, and hyperglycæmia bring the two diseases very near together. In diabetes diet is regarded as of paramount importance, but in hyperthyroidism diet tends to be ignored. Apart from the evidence of the value of correct diet given so far, much more is obtainable. McCarrison[10] has shown that excess of fats, some fatty acids and protein cause hyperplasia of the thyroid; that a high carbohydrate diet tends to reverse these changes. He has shown that deficiency of any or all of the vitamins increases the incidence of goitre in rats on a diet containing too little carbohydrate, and that excess of vitamins and onions protect animals from goitre.

The altered metabolism of hyperthyroidism gives us the following indications for treatment:—The abnormal muscular metabolism demands as complete rest as possible, and an increase of iodine intake; excess of adrenaline requires sedatives and freedom from emotion and excitement; since deficiency of vitamins induces thyroid hyperplasia, an excess of vitamins appears to be indicated; as carbohydrate excess diminishes thyroid activity, the diet should be rich in carbohydrate; the excessive glycogenolysis should be combated by any means in our power, otherwise depression of endogenous insulin, and failure to utilize glucose, will continue.

Rest.—This should be absolute rest in bed until weight has nearly been regained and the pulse and eye signs are normal. If sleep is poor, bromides should be allowed in adequate dosage; cannabis indica increases the effect of bromide. When the signs become favourable, the patient is allowed out of bed for a few minutes daily, and this time is very gradually increased if pulse and weight remain favourable. The adrenal factor demands as complete freedom from emotional stimuli as possible. The manner of the physician is of importance; he should be quiet, confident, and not in a hurry. Quietness of the surroundings is of considerable importance; our hospitals, as a rule, are very noisy places. I am convinced that if home conditions are medium to good, these patients do better at home. Half of the last series, even some cases of severe degree, have been treated throughout as out-patients, and without exception they have done well.

Diet.—As I hope to have shown, this is of prime importance. The diet should consist of fruits, vegetables, sugars and starches. Fat is supplied only in the form of butter. Nitrogen of animal origin is given as gravies, to make the vegetables more palatable, as fruit or meat jellies, and a very small helping of some flesh about every second day. Eggs, milk and other milk products than butter are not allowed. McCarrison has shown that onions are of use in preventing goitre in animals on a goitre diet; how they act is not known. Onions are rich in certain sulphur compounds, these give the onion its special flavour; it may be that these compounds, like sulphur parenterally, increase hepatic glycogen. Onions, raw if tolerated, otherwise boiled, are given daily; boiled onions at night appear to help sleep, and the patients so far have rather welcomed them.

Vitamins.—Excess of vitamins *A* and *D* is obtained by giving three tablets of ostelin daily. Bemax, a tablespoonful daily, yields enough of vitamins *B* and *E*. The diet, consisting of excess fruit and vegetables, already gives an abundance of vitamin *C*.

Depression of thyroid activity by X-radiation has now been discontinued; about thirty cases have been treated with X-rays plus the rest of the treatment. It is sometimes said that X-radiation may make subsequent surgical intervention more difficult; but no case so treated here has ever needed surgical aid. X-radiation of the adrenals is claimed to give good results, as would be expected; in passing it may be noted that X-radiation of the adrenals is also benefiting cases of diabetes,[11] for the same reason—diminution of glycogenolysis from lessening of adrenaline. It has been noted that X-radiation of the mid-brain is also giving results.

The supply of iodine.—This has been difficult until recently. Mild cases of hyperthyroidism do well on iodine medication, but the severe grades mostly do well for a week or two. This is termed the iodine remission, but it is transient, and when it has passed the patient is often worse off than before. Certain French schools consider that this is due to tolerance, and steadily increase the dose until enormous amounts are given; they claim good results. Until recently iodine was withheld, except from one patient who could not afford the time necessary for medical treatment on financial grounds; this patient had only six weeks in which to recover sufficiently for light work, and at that time we required about six months for medical treatment. Now we should regard six weeks as short, but possible. Owing to the addition of fluoride we have no difficulty in supplying iodine; fluoride perpetuates the iodine remission.

Fluoride.—This was first used by Goldemberg, of Buenos Aires.[9] He reported that it was useful and gave a short account of seven cases, but he gave no explanation as to why it was of use. As two of the four halogens, bromine and iodine, are accorded valuable in the treatment of hyperthyroidism, it appeared worth while to try fluoride. Goldemberg reported that sodium fluoride was usually tolerated badly, and he used the ammonium salt. I commenced to use sodium fluoride early in 1931, just after Goldemberg's publication; fluoride was added to the rest of the treatment. It was found that each patient shortly experienced symptoms of toxicity, just as Goldemberg had described. These symptoms suggested that the salt irritated the upper part of the small intestine; therefore astringents were added to the solution and it was then readily tolerated and the amount could be steadily increased. It has been continuously administered to several of the patients for nearly a year, to their benefit.

One patient only failed to respond; in spite of all treatment she lost weight at an alarming rate—she dropped to 5 stones. As this looked like being a failure, iodine, as Lugol's solution, was added to the fluoride, to get an iodine remission in which to consider operation. The patient refused, however, but the iodine remission persisted, and she put on weight at a rapid rate.

Since that case, iodine has been added to the fluoride in all the series, and there has been a remarkable speeding up of recovery.

Action of fluoride.—Of this little is known. It has been used as an anti-coagulant; it is used as a safe preservative of milk products, beer and wines; it is largely used in insecticides for lice, cockroaches and flies especially. In toxicology it is known to cause fatal cachexia in cattle feeding on pastures contaminated by the fluoride in the smoke of chemical factories; it also causes a condition similar to osteomalacia, with spontaneous fractures in cattle and laboratory animals. No human cases of poisoning have been reported, even from the factories responsible for the veterinary cases.[12] An experiment on cancer tissue[13] may throw a little light on the utility of fluoride; it was reported that the addition of fluoride to living cancer tissue, *in vitro*, occasioned a diminution of glycolysis and lactic acid production. This pointed to the possibility of fluoride acting by lessening glycogenolysis, which we have seen is excessive in hyperthyroidism. I have had some experiments carried out to determine whether there was any evidence for this supposition; for the actual carrying out of the chemical and experimental work I have to thank Dr. D. Stone and Miss Keyser.

We fed mice and rabbits on the highest tolerated dose of thyroid extract, and in some cases also injected thyroxin; this was continued for two to three weeks. The animals were divided into two equal batches; the controls were fed with sodium chloride, the others on a tolerated daily dose of sodium fluoride. At the end of the period blood-sugar curves were made in the rabbits, not in the mice; then the animals were killed and glycogen estimations carried out on liver and muscles. Fluoride tends to lessen hyperglycæmia induced by thyroid feeding in rabbits, but the action is not marked. We find that fluoride tends to cause increase in hepatic glycogen in mice and rabbits fed on large doses of thyroid; but we cannot find any action on the glycogen of muscle, which includes heart muscle. The figures are based on twenty mice and twelve rabbits. These results are given with reserve, as the experiments are too few for certainty. This experimental finding may indicate that fluoride acts by breaking the vicious circle between liver, thyroid and adrenal.

There may be other explanations. Thus, Goldemberg[9] noted transient diabetes insipidus in humans treated too intensely by intravenous ammonium fluoride; this suggests that it might act by depressing the over-active mid-brain centres noted above. Another possible explanation is that it acts as an intestinal antiseptic; McCarrison,[2] following his demonstration of enteric infection in goitre, advised treatment by large doses of thymol, on account of its antiseptic action. Much more experimental work will have to be done before we shall know definitely how fluoride exerts its action.

Toxicity of fluoride.—Cristiani[12] gives the lethal dose, administered at one time, as 7·5 grains per kilo. of guinea pig; this works out to about 1 oz. for an average adult human. We have fed mice for weeks, and a week for a mouse corresponds nearly to a year for a man, with a dosage of fluoride which would correspond to 1 drachm a day for a human adult; these mice showed no ill-effects. When the dose was doubled, the animals became ill, but recovered when fluoride was stopped; it should be noted that we did not add the chlorodyne and catechu to this fluoride for the mice. Rabbits tolerated rather less fluoride than mice, and reacted in much the same manner. The average effective dose in human therapeutics works out as about 1½ grains per day; this is considerably less than the toxic dose; much greater doses have been added to milk and wines without any toxic effects being noted, as fluoride is regarded as being a safe preservative.

Conclusions.—These conclusions are based on fifty-three cases; the fate of two cases is not known; the other cases have slowly recovered. Since fluoride was introduced sixteen cases, mostly of severe grade, have been treated; these have recovered, or are recovering much more quickly. Then since iodine has been added to fluoride the more recent cases have responded still more rapidly. It requires about two weeks to get the remission, and so far this remission has persisted.

The duration of medical treatment has been considerably shortened. At first I told the patient to wait and see; later that treatment would have to be continued for six months, but told the practitioner in charge that a second six months would probably be required. Last year it was said that results from medical treatment were quite as effective as those from surgery, but that much longer time was necessary. Now we can get the iodine remission in about two weeks, and a further two weeks only is required to convince the patient that she is on the road to recovery. At about six weeks from the start, the patient has a good chance of being allowed up, and progress is therefore fairly rapid. Surgery requires two to three weeks of preoperative treatment, and as much again, or longer, to recover from operation; there is, therefore, not much to be said for surgical saving of time now. Though the mortality is claimed to be low for operation carried out by surgeons of great experience in hyperthyroidism, it is said that it is not low for general surgeons. As I have been a practical pathologist, I am inclined to distrust surgical (and medical) statistics; there are too many uncredited "extras." In this series there have been no deaths, or any indication of the likelihood of deaths; but the total number of cases is too small for certainty.

The administration of fluoride.—Two solutions are advised, as their mixture produces an unpleasant deposit :—

℞

2 per cent. aqueous solution of sodium fluoride	m xxx
Lugol's iodine	m x
Water	to ʒi

℞

Chlorodyne	m v
Tincture of catechu	m xv
Simple syrup	m xx
Water	to ʒi

These two are mixed in equal parts and taken immediately after meals thrice daily. It is best to begin with half the amount of the first, but full amount of the second for a few days; then gradually increase until equal parts are taken. When well tolerated, the amount of both is increased; we have not yet increased beyond 1½ drachms, as cases have responded well.

The problem of the best time to deal with sepsis is considered to be of causal importance. Dental or tonsillar sepsis has been treated palliatively until the patient has practically recovered from hyperthyroid symptoms.

Summary.—The pathogeny of hyperthyroidism is reviewed and indications for medical treatment are demonstrated. A simple system of treatment is given which appears to be fairly rapidly effective, even in severe cases. No case treated on these lines has failed to improve up to the present, although at least half of the cases had been told by competent consultants that operative treatment was imperative to save life.

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The Treatment of Drug Addiction: A Review

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Part I

In respect of drug addiction, prevention is so much better than cure that too much stress cannot be laid upon it; but with prevention in the wider sense, which deals with the root causes of addiction, the individual practitioner has not much to do. He cannot limit the production of narcotic drugs to the amounts needed for legitimate purposes, and he can make but a small contribution to the immense public health problem of the unfit. He must leave the first to bodies such as the League of Nations, which can call upon the collective wisdom of the nations in council. He must leave the second to time and the accumulated knowledge derived from the teamwork of generations. He is able himself only to deal with such of the secondary causes as come within his purview and are more or less under his control.

Coming now to the more limited sense of the word "prevention," there is a certain school of opinion, of which some French physicians are exponents, [1, 2] which believes that the chief hope of prevention lies in the thorough treatment and complete cure of the addict. They not only invert the maxim that prevention is better than cure, but hold that, in respect of addiction, cure *is* prevention. Their belief is summed up in the motto : "Quench the demand and the supply will take care of itself." Those who hold this view think that to attack the problem of prevention by attempts to limit production and manufacture is to attack it on its most hopeless side, and they point to what they consider to be the meagre results in this direction of the well-meant efforts of the League of Nations. But while no means should be neglected to bring about cure, this view appears to take insufficient account of two of the most outstanding features of addiction—the psychopathic basis and the tendency towards relapse. Addiction is not a disease which protects against itself but, on the contrary, one attack seems to predispose to another, and the addict, save in the comparatively infrequent instances in which the mentality is normal, becomes addicted more easily the second time than the first. It is not by accident that a drug habitué relapses—relapse is part of the natural history of addiction. As Hahn[3] very aptly puts it: " As the addiction signifies a way of escape from the neurosis, so the neurosis will reappear in an aggravated form after withdrawal, that is, after the closing of that way." When the addict finally passes from supervision and returns to his unsheltered surroundings, there comes a time sooner or later when his old conflicts, his old sense of inadequacy, his old *tedium vitæ* assail him anew. He remembers the relief afforded him by his drug, and the temptation to resort to it again, " just to tide over the bad time," proves too often irresistible by his enfeebled will.

It is true that this school means by cure not merely withdrawal but a prolonged period of surveillance in special curative institutions, such as are described in Brazil, and a medico-social service with the provision of expert physicians who will either visit the addict at stated intervals, or see him at regular dates on which it will be compulsory for the addict to present himself. But this is obviously a counsel of perfection, hardly likely to be practicable for some time to come.

It is greatly to be feared, then, that prevention is by no means so simple, and that efforts directed merely towards the suppression of the demand for narcotics are foredoomed to failure. Not only will our " cured " addicts, in many instances, constitute a body of persons more susceptible to the lure of narcotics than ever before, but behind them in reserve is the vast army of psychopaths ripe and ready for their first addiction when circumstances are favourable. An army is not destroyed when its reserves are intact. For some time to come, perhaps for all time, it will be vastly more important to prevent the making of an addict than to cure him when made. It is scarcely a paradox to say that the best way to be cured of addiction is not to become an addict, and that the best amethyst against addiction is the possession of a normal psyche.

What, then, can the individual practitioner do by way of prevention? He can see to it that no addict is created by any fault of his own. He can remember that there are pain-relieving drugs other than morphine, etc., which have their place in suitable circumstances. He can remember, with Levinstein,[4] that the history of morphinism dates from the invention of the syringe, and see to it that the patient himself is never entrusted with the instrument. Moreover, the addict physician is a menace wherever he is found, and, unfortunately, owing to special opportunities, addiction has claimed many victims among the members of our own profession. In this direction, therefore, prevention begins at home. The practitioner can also act with special caution when ordering narcotic drugs to unstable persons. He can read, re-read and put into practice the wise advice given by the Departmental Committee on Morphine and Heroin Addiction in sections 56–60 of their report.[5] The family physician is also, as Römer remarks,[6] in a specially favourable position to recognize early the beginning of functional nervous and physical disorders which are so often of tardy development and which may be amenable to treatment in their early stages. He may thus be able in some cases to prevent the development of a condition which creates a predisposition in the patient to resort to narcotics, and so play an important part in prophylaxis. In short, he both has and can create many opportunities for contributing towards prevention of addiction. The reader who wishes to pursue the subject further would do well to consult a series of articles on the " Indispensable uses of Narcotics," which appeared weekly from 14 March to 6 June, 1931, in *The Journal of the American Medical Association.*

In connection with this important matter of the prevention of addiction, it is interesting to note that recently the Committee on Drug Addiction of the National Research Council in the United States have commenced an extensive collaborative research in alkaloidal chemistry by chemists and pharmacologists with a view to preparing, if possible, a non-habit-forming substitute for morphine that would yet possess the desirable actions of morphine. It is greatly to be hoped that their somewhat Herculean labour will be crowned with success.[7]

But when addiction actually exists, every means must be used to free the patient from his bondage, though the prognosis of addiction, save in certain cases, is not hopeful. The statistics are gloomy and depressing. Yet it is not for the practitioner to base his therapeutics, as Mr. Bertrand Russell does his philosophy, " on the firm foundations of unyielding despair." Statistics are depressing, it is true, but any given patient is not to be considered as a possible future unit of a statistical table, but a fellow-being urgently in need of all the help that can be given. That physician will succeed best who is wisely foolish and assumes that every addict genuinely wishes to be cured, and is curable, until the contrary is definitely proved.

It was once said that the gravity of a disease may be gauged by the number of cures for it. The more " cures " the more incurable it is. Judged by this criterion, addiction is a very serious disease indeed.

There are hundreds of cures for it, and they are ever being augmented. Even in a little country like Denmark we are told by Larsen[8] that during the year 1930 no less than ten new methods for the treatment of chronic morphinism were tried. This article does not pretend either to enumerate or evaluate all the varied methods which have been put forward or which are now in use, nor is it intended to lay down any definite principles for individual cases. But it may be worth while to take a bird's-eye view of the methods in vogue in various parts of the world in the hope that the experience of the many may correct and amplify the experience of the one. It must first be remembered, however, that the complete treatment of addiction comprises two distinct stages, namely : (1) disintoxication, and (2) rehabilitation, and of these the latter is far the more important as well as far the more difficult. There are scores of methods which will free the addict from his drug, but by what method can we free him from himself ?

(1) *Disintoxication.*

By disintoxication, then, is meant the freeing of the addict from his poison or, in other words, the withdrawal of the drug, either suddenly or gradually—followed by measures directed to the restoration of his health, at least from the physical standpoint. By rehabilitation is meant no less than the re-creation of the personality, for it is only when this is done, or can be done, that the possibility of relapse is eliminated. First, then, we have to enumerate the many methods which have been devised with a view to disintoxication. The following table is an attempt to classify those methods :—

(A) *The ambulatory method.*

(B) *Methods devised to secure withdrawal within a limited period* :—

(1) The abrupt (sudden) withdrawal method: (*a*) abrupt withdrawal without special measures (" cold

turkey "); (*b*) abrupt withdrawal under hypnosis; (*c*) abrupt withdrawal assisted by drugs of the atropine series; (*d*) abrupt withdrawal assisted by "specific" treatment (e.g. "narcosan," vegetable proteins, antibodies); (*e*) abrupt withdrawal with special symptomatic treatment (e.g. by means of euphyllin or insulin).

(2) Rapid withdrawal methods: (*a*) rapid withdrawal with injections of autogenous serum; (*b*) rapid withdrawal aided by drugs of the opium series; (*c*) rapid withdrawal under treatment by endocrine preparations; (*d*) rapid withdrawal under light anæsthesia; (*e*) rapid withdrawal under drugs of the atropine series.

(3) The gradual reduction method.

(C) *Treatment by the "conditioned reflex" method.*

It is to be understood that not all the special subgroups are necessarily clean-cut. Thus, one may be combined with another in an almost endless series of permutations. However, it is hoped that the scheme may prove a useful general guide, and it will certainly facilitate description.

THE AMBULATORY METHOD

The so-called "ambulatory method" is the one which will of necessity be most frequently employed by the non-specialist practitioner in this country, and we will begin by describing it. The ambulatory method of treatment may be defined as one in which the patient is free to go about as he pleases and receives from the practitioner (either in material or indirectly by means of a prescription), and under his instructions, such quantities of his narcotic drug for self-administration as are deemed to be necessary. The object aimed at is gradually to reduce the amount of morphine, heroin, etc., so that with the least possible discomfort it can ultimately be withdrawn altogether, or reduced to a certain minimum quantity.

The "ambulatory" treatment is not, properly speaking, a disintoxication treatment at all, that is to say, only rarely is it possible entirely to withdraw the drug from the patient while he is completely at liberty. It is too much to say that this can never be done—in a few, though very few cases, it has been accomplished. But it is true that the most that can usually be hoped for is a gradual reduction of the amount taken to a minimum point and, in some cases, all that can be accomplished is to prevent an increase in the dose habitually taken. On this account, nothing too bad can be said of it by some authorities, and in certain countries it is nominally forbidden altogether. But, viewing the matter from a commonsense standpoint, it is better than nothing when the choice is between it and nothing as, in present circumstances, is so often the case. Something may be accomplished, if not always very much, provided that the practitioner possesses the requisite gifts of skill and personality. Unless and until, therefore, it be possible for the various countries to provide sufficient accommodation for institutional treatment and bring it within the reach of all addicts, rich or poor, and, if necessary, adopt compulsory measures, the very imperfect ambulatory method is all that is at the disposal of the physician in many instances. Is it wise to reject even a tenth best when all higher grades of the best are unattainable?

METHODS DEVISED TO SECURE WITHDRAWAL WITHIN A LIMITED PERIOD

The method of abrupt withdrawal has had a somewhat chequered career. It is of German origin and seems to have been first systematically tried by Levinstein, who reported his results in 1875.[4] As a result of his advocacy, some converts were made, both in his own country and in others, the apparent simplicity of the treatment being its chief commendation. However, it was a severe procedure and it gradually fell into disfavour. Clifford Allbutt, writing in 1912, seems to have assumed that it was not likely to be revived. This has not proved to be the case; since he wrote, the practice of withdrawing the addiction drug in one cut has found an increasing number of advocates in many countries. It has, for instance, some enthusiastic exponents in the United States, Canada, France, Denmark, the Netherlands, and elsewhere, while in the land of its origin it seems rapidly to be becoming the method of choice, if we accept the results of a questionnaire sent by Wolff to all the German provincial hospitals, nursing homes, and psychiatric clinics, as well as to private institutions and some individual doctors. He also made some inquiries in Austria and Switzerland. His results showed that out of 198 answers, 90 expressed a preference for this method and a further 24 were in favour of it, with certain reservations. Eighteen out of 24 University clinics used or preferred it. But though opinion was thus generally favourable, we may note that some of the replies received by Wolff were distinctly adverse.[9]

Some of the supporters of abrupt withdrawal are of opinion that the psychic factor is an important element in the production of the withdrawal symptoms. Thus Nellans and Massee[10] state that the absolute certainty which the patient has that he will receive no more "junk," regardless of consequences, is perhaps the most important therapeutic agent we have and, as regards the alleged danger of sudden withdrawal, they can only reiterate that the method has, in their experience, been a perfectly safe procedure. Chopra also states that his work in the gaols shows that the addicts, being fully aware that they could get no more of the drug, showed no marked abstention symptoms, which circumstance confirms him in his opinion that there is a large psychic element, in addition to the physical element in the production of the symptoms.[11] Light also inclines to this view, though he acknowledges that the subject requires further study.[12] On the other hand, some recent work of Kolb and Du Mez on monkeys seems clearly to show that this psychical explanation must not be pressed too far and that not all the withdrawal symptoms can adequately be explained on this theory.[13] It is best to avoid any undue dogmatism at present.

In America, especially, some surprisingly good results have been reported from abrupt withdrawal by various physicians. Sceleth and Kuh, for example, treated 5,000 cases of morphinism in this way and encountered no serious withdrawal or asthenic symptoms and had no deaths.[14] Nevertheless, the contrary experience of other equally good observers must be respected and British opinion is, with a few notable exceptions, against the employment of so stark a method. The witnesses examined by the Departmental Committee, save one eminent authority and some of the medical officers of H.M. Prisons, were emphatic in their disapproval. They regarded it as dangerous and did not agree with those who state that relapse is less frequent with the abrupt than with the milder procedures. In this they are not without support, for one of Wolff's respondents, a very experienced psychiatrist, gave it as his experience that the permanent results of the sudden method were very bad and that there was a strong tendency to relapse. Nor do the statistics furnished by Nellans and Massee encourage the belief that relapse is less frequent than with milder methods. In this connection, also, we may quote the remarks of G. Laughton Scott,[15] in his recent book, *The Morphine Habit.* He regards the avoidance of "withdrawal shock" as playing an important part in the ultimate issue, and thinks there is no doubt that an easy withdrawal is "calculated to diminish the tendency to relapse." Relapse is only too common with any method, and as denarcotization is only the first and easiest step towards cure, it appears unjustifiable to cause unnecessary suffering by employing as a routine the harsher treatments. No doubt, circumstances alter cases, and no criticism is intended of those who find that the complete and abrupt cut is successful in their hands, but in this country it has not been found, generally speaking, that the abrupt method presents sufficient advantages to outweigh its difficulties and drawbacks.

It goes without saying that so drastic a method can only be carried out in a special institution provided with a skilled staff of nurses and physicians. It is interesting to note that some of the best results were obtained in prisons. Friedlander holds that withdrawal without compulsion is impossible and that if it be attempted in a non-detention hospital there is relapse in 90 per cent. of the cases and the treatment leads to disillusion on the part of both patient and practitioner.[16] No one has ever recommended the procedure as suitable for employment while the patient is at large, and even its most enthusiastic advocates recognize that it is contra-indicated in cases in which the patient is old, feeble, or suffering from actual organic disease of any kind. Some also would regard sudden withdrawal as contra-indicated where the addiction has been of very long duration, though others do not regard this circumstance as necessarily a negative indication. On the other hand, even thoroughgoing opponents of the measure would generally admit that in certain specially selected cases it may be the treatment of choice, provided that the institution chosen for the reception of the patient is in every way adequate. The various forms of abrupt withdrawal now call for some consideration.

(*a*) *Abrupt withdrawal without special measures.*—In its simplest form, the drug is abruptly and completely withdrawn from the addict. No special drugs are used, but the patient is put to bed for the first few days and is helped by skilled nursing and remedial measures of a general character. Free, but not excessive, purgation is employed, and baths and massage may be useful. An essential factor in the treatment is the knowledge of the patient that he will get no further dose of his narcotic whatever happens. Diarrhœa, sickness, etc., are treated on general lines. Insomnia is met by some simple hypnotic, such as paraldehyde. Collapse is combated by the employment of cardiac tonics, and so on. In the very rare cases in which collapse is so severe that the patient's life appears actually to be in danger, a small dose of morphine is given. Yet it is surprising to read how seldom this exception is necessary. Some observers have treated hundreds of cases by abrupt withdrawal and have never had to resort to a further administration of the drug in any circumstances. It is the usual experience that the worst is over in about 48–72 hours, and in eight to ten days the patients are well on their way to recovery, in so far as the physical side is concerned. Good descriptions of this " cold turkey " method with all essential details are given in the papers of Richards[17] and Nellans and Massee.[10]

(*b*) *Abrupt withdrawal with intensive use of hypnotics.*—More commonly, however, some special form of treatment or some special drugs are used. Certain physicians use a very interesting modification in which, so to speak, the withdrawal is treated as a kind of surgical operation to be conducted under anæsthesia, or, more correctly, under hypnosis. The withdrawal symptoms, as van Otterloo and Linn put it, are " veiled by means of sleep."[18] A whole battery of drugs has been used for this purpose by different exponents of the method: paraldehyde, somnifen, sodium luminal, and other barbiturates, amylene hydrate, pernocton, etc.—we have no space to enter into the details of all these processes and the method is not without danger. Those interested may consult the paper by van Otterloo and Linn just mentioned and also those of Schlomer[19] and Herold.[20] A modification of the "sleep method" described by Neuberger deserves, however, fuller mention. He employs a light chloroform narcosis, much in the same way as in midwifery cases.[21] Properly speaking, this author's method is not abrupt withdrawal, but a rapid one (*accélerée*), yet we will describe it here, for convenience sake, in order to complete this account of the hypnotic withdrawal methods. The chloroform is used to combat "the state of need" and a condition of semi-narcosis renders the deprivation of the drug supportable. The paroxysms of craving are treated in the same way as the pains of childbirth often are, and whiffs of the anæsthetic are given from time to time so as to secure a light narcosis. The author calls it *anesthésie à la reine.* The chloroform is given from a drop-bottle on a compress, and is administered whenever the patient feels the urge of his craving. The method, as might be expected, requires close attention on the part of both practitioner and nurse. The dose of morphine, etc., is quite quickly reduced, the chloroform inhalations taking the place of the drug very efficiently.

(*c*) *Abrupt withdrawal assisted by drugs of the atropine series.*—The drugs employed in this modification are scopolamine, hyoscine, and atropine. Here will be described the scopolamine treatment as carried out at the Philadelphia General Hospital by Light and Torrance as it furnishes a good example of the general management of cases treated by this method :—

> Before the addiction drug is entirely cut off, the patient is for the first twenty-four hours given morphine sulphate hypodermically in sufficient quantities to prevent withdrawal symptoms. He is placed upon a liquid diet for this period and given a mild dose of calomel or mercury, followed in eight hours by a saline cathartic. At the end of the twenty-four hour period, three doses of scopolamine hydrobromide 1/200 gr. are administered hypodermically at four-hourly intervals. With each dose is given 1/40th grain of strychnine. Then a few more injections of scopolamine are given, the dose being gradually raised to 1/100 gr. and, at the end of 36 hours, the drug is stopped. When the effects of the scopolamine begin to disappear, large doses of phenobarbital are given if the withdrawal symptoms

are still quite severe, or a single dose of ¼ grain of morphine is administered. From this time on treatment is purely symptomatic, consisting chiefly of sedatives to promote sleep and sodium bicarbonate for any gastric distress. The patients are usually discharged at the end of ten days.

On the results the authors frankly remark: "It is our opinion from the number of addicts who have come to us from other institutions and the fact that 50 per cent. come back to us for another treatment, that present methods, including our own, leave much to be desired."[22]

As to the atropine and hyoscine treatments, Lambert, who tested them under strict control conditions, reports unfavourably upon them: the patients suffered quite as much as when the sudden withdrawal was unassisted by these drugs.[23a] In another paper he refers to his results with scopolamine which were also disappointing.[23b]

(*d*) *Abrupt withdrawal with "specific" treatment.*—By "specific" treatment we here mean a general treatment based on some definite theory or hypothesis as to the nature of the withdrawal symptoms. One of these treatments which has attracted a good deal of attention and concerning which many papers have been written is conducted with a preparation termed "narcosan." Narcosan is stated to be a solution of lipoids, proteins and water-soluble vitamins. The lipoids are obtained from soya beans and cotton seeds, the proteins from alfalfa seeds or Hungarian millet, and the vitamins from various plant seeds. Narcosan was first brought into prominence by Lambert and Tilney in a paper published in 1926.[24] They state: "the theory of action of narcosan in the body is that narcotics, such as morphine, call forth in the body certain protective substances to neutralize them. If the narcotics be suddenly withdrawn, and not given, these neutralizing substances are themselves toxic to the body. The lipoids in narcosan neutralize the toxic substances in place of the narcotic." The theory that alkaloids can act as antigens is, however, discredited by very excellent authorities.

Martin and Williams[25] think that the action of narcosan may be explained by the presence in it of certain non-specific vegetable proteins which may stimulate the endocrine glands. They themselves did not use narcosan, but a preparation of alfalfa protein which they combined with orchitic substance in the case of male and an ovarian hormone in the case of female patients. They state that their results were very gratifying. The patients suffered little, and nursing was minimized. Though they used alfalfa, they see no reason why the proteins should not be derived from millet, rape, hemp-seed, etc. In a further communication (1930) they report that their " proteal " treatment has continued to give very satisfactory results, but they now supplement the proteal and sex-hormone preparation by adrenal cortex preparations.[26] The history of the controversy over narcosan is most instructive, and readers who care to pursue it may consult the papers already mentioned and also those of Schieb,[27] Nellans and Massee,[10] some later papers of Lambert[23a & b,] and Johnson.[28] Another interesting "specific" treatment is that with blister serum, advocated by Modinos, and will be described under " rapid withdrawal."[29]

(*e*) *Abrupt withdrawal with special symptomatic treatment.*—In some varieties of the abrupt method special drugs are used which by virtue of their peculiar properties are credited with the power of removing or alleviating certain of the distressing abstinence symptoms. We will mention here two of the most recent procedures, viz., the use of euphyllin and of insulin.

In a recent paper, Alexandra Adler has advocated the injection of euphyllin (theophylline-ethylene-diamine) to relieve the withdrawal symptoms, basing her therapeutics on Barbour, Hunter and Richey's[30] observations that morphine withdrawal induced hydration of the blood and probably of the tissues in general.[31] She believes that the clinical picture of the abstinence symptoms resembles the "water poisoning" described by Rowntree.[56] The euphyllin, a powerful diuretic, is given by intragluteal injection or, if that is badly tolerated, by intravenous injection (arm). The dose used is 0·48 grm., and the injections are given daily, morning and evening, for from 3–10 days according to the severity of the symptoms. The results in twelve cases are reported and were considered eminently satisfactory. Further trials are obviously necessary before an evaluation of the method is possible.

Of late, the use of insulin to mitigate the symptoms of withdrawal by the sudden process has been tried in Germany, Switzerland, Denmark, and is, we believe, also in use in this country. In 1928, Hirsch[32] wrote that he found a low blood-sugar value in the withdrawal period and he claimed good results by injecting grape-sugar solutions. Somewhat later, Anton and Jacobi[33] used insulin and grape sugar with favourable results. Sakel, in 1930,[34] used insulin alone, which he gave in doses up to 80 units in the 24 hours, but he regulated the dose according to the severity of the withdrawal symptoms. The insulin was given for 6–8 days, and the morphine was cut off from the start. He had no failures in the 15 cases he treated, and reported that in all the patients the somatic symptoms (vomiting, anorexia, and diarrhœa) were cut short with absolute certainty, and the psychic symptoms were also very favourably influenced. He met with no case of insulin shock. By means of control experiments he deduced that the effect of the insulin was a real one and not merely a mental result of the injections. Larsen[8] states that Danish experience of the procedure is very favourable, and he also stresses the absence of anorexia. More recently still (1931) F. Braun[35] gives his experience of the plan in six severe cases of addiction.

He gave up to 100 units a day and employed soporifics as well (luminal, etc.). Free intake of fluids is recommended. In all the patients the morphine was abruptly withdrawn, the insulin taking its place and, in all, the effect was striking. " Immediate tranquillity " was noted after each injection. Braun does not claim, however, that insulin removes every abstinence symptom, but that by its use the abstinence troubles are rendered of short duration and quite tolerable. " We gave them the injections whenever they became restless and demanded them . . . all felt as though transformed, revivified, which was certainly not only caused by a psychogenic reaction." Hypoglycæmic symptoms were either absent or only set in when the abstinence symptoms of withdrawal had already vanished.

Sugar solutions were, therefore, either completely dispensed with or only prescribed after the subsidence of the acute symptoms, i.e. on the third and fourth days, the insulin dosage still continuing.

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(*To be concluded*)

Sea-sickness

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THE consensus of considered opinion is that the primary cause of sea-sickness is a derangement of the labyrinthine function. Many problems are said to be left unanswered by this conception, so this presentation is intended to show that every important feature associated with sea-sickness and which seems to have an independent status is either secondary or accessory to the vestibule. The great variety of views on the nature of sea-sickness arises partly from a resistance to accept an association so remote as that of a derangement of function with symptoms such as nausea, and signs such as a fall of blood pressure, so the search continues for some more direct and, needless to say, more specious relationship. The first task, then, in an exposition of sea-sickness must be to link up the various types, the known signs and symptoms, and explain their relationship through a common origin. With this in view it is perhaps well to discuss certain prevailing views before venturing on re-stating the labyrinthine theory.

Ketosis.—The presence of ketosis, prior to the onset of vomiting along with the apparent relief of symptoms by the indicated treatment of alkalis and glucose, has led to the opinion that ketosis, if not the cause of sea-sickness, is yet a contributory antecedent. Ketosis, however, only occasionally presents itself in this *time* relation, though it frequently follows vomiting.[1] It is, indeed, questionable whether the cases which exhibit the pre-vomiting ketosis are so-called " bad " cases or even display an unusual susceptibility to sea-sickness. What is very certain is that acknowledged cases of diabetes mellitus, among passengers and crew, who may be expected to show, occasionally, this particular feature, show no more than average susceptibility. Why it should then be even a contributory cause will be difficult to explain since vomiting is not an admitted symptom of ketosis like air hunger and drowsiness. We must, therefore, conclude that its priority does not indicate a causal connection with vomiting. Seeing, however, that the symptoms and signs of sea-sickness are many and variable, are there grounds for believing that it may, nevertheless, be an inconstant symptom like headache, nausea, mental confusion? Before assuming this, it is necessary to exclude from the number exhibiting ketosis those whose ketosis can be explained as due to other causes. Among those who exhibit pre-vomiting ketosis are those who prior to sailing were perhaps undergoing moderate starvation in the popular reduction dieting, those who have been taking morphia prophylactically against sea-sickness, those who have been under salicylate treatment, a few with some febrile disorder, and, lastly, an occasional diabetic case. Figures, however, are lacking. The facts so far apply only to cases of sea-sickness, prior to vomiting, which have been examined for this reaction; from these there is sufficient evidence that pre-vomiting ketosis is by no means frequent.

If, as may be assumed, there are still a few cases not included in the above list who exhibit this reaction, are we to conclude that it may be one of the many symptoms of sea-sickness or an occasional antecedent? The answer to this throws considerable light on a type which is almost the first to succumb to boat movement. This type is easily distinguishable and should on no account be overlooked, since it is the most responsive of all types to prophylaxis. When pre-vomiting ketosis is due to none of the above causes it may yet be found occasionally in this type, probably sufficiently often to account for the otherwise unexplained residue of cases. There is a type of traveller, well known to ship's surgeons, who is unmistakably apprehensive. This is a clearly defined type of low sugar-tolerance; it responds actively to sympathetic adrenaline excitation and is, in fact, called the sympathetic type. On embarking, after some days' duration of anorexia, these subjects pass through a stage of hyperglycæmia due to sugar mobilization, then, when the sugar is exhausted by tissue oxidation, with no further ingestion of sugar, there follows a stage of hypoglycæmia. Even if food, despite the distaste for it, is taken, the sympathetic alimentary stasis prevents assimilation, and if, in fact, vomiting occurs, even up to twenty-four hours afterwards, the food may be expelled unchanged. The call, then, on fats and proteins due to carbohydrate starvation leads to the release of fatty acids—evidence of ketosis. When, therefore, it is found in these cases it is not a symptom of sea-sickness, but is associated in the sympathetic type with a condition of apprehension of some days' duration. Furthermore, there is no reason to believe that its presence has the slightest effect on the course of sea-sickness or that it lowers the threshold to provocative movement.

Treatment by glucose and alkalis has been strongly recommended by many ships' surgeons and its success is not without grounds. Its pretension to treat the cause is, as we have seen, ill-founded, but its value in the treatment of symptoms has some justification. Gastric stasis and pyloric spasm are both in these cases due to the sympathetic over-action. If food has been taken the condition of pyloric spasm has been aggravated by the consequently increased acidity. The oral administration of the bicarbonates, by lowering the acidity, may relieve somewhat the pyloric spasm and permit the passage of food onwards. A small amount of glucose may now pass on, and by its assimilation correct the sugar loss and so the ketosis.

It has been stated that ketosis is aggravated by oxygen lack when the patient is confined to his cabin with the portholes closed against the heavy seas. The diminution of oxygen in these circumstances is far too trifling to cause the least appreciable effect. What has apparently been overlooked is that these circumstances of poor ventilation, of high humidity and of heat, are all calculated to act adversely by increasing both the lassitude and headache so common in sea-sick cases.

Visceral factor.—The danger of attaching too much importance to certain local symptoms and signs is again evident in the rather common but naïve opinion that the obvious place where the maximum effect of the imposed movement will be felt is the abdominal viscera. Attention is directed entirely to the manifest derangement of the stomach, the sinking sensation, the nausea and vomiting. Other equally important symptoms of sea-sickness, such as vertigo, mental confusion, lassitude, headache, blurred vision, skin reactions, and so on, are not considered as also requiring explanation. It is pointed out how nearly related in time these sensations of sinking and nausea are to certain phases of ship movement, so much so as to suggest a causal connection. The maximum effect of this movement takes place, as might be expected, not during the roll or pitch, but at the moment of acceleration, and still more at the moment of retardation and change of direction. The viscera of the abdomen are relatively mobile, and are therefore more liable than the rest of the body to be affected by these abrupt changes, when the whole body is thus subjected to movement. For the same reason the changes of pressure are thought to affect the liver by causing alternating congestion and anæmia. No evidence of this is produced and there is no reason to assume that if this were so the condition would result in the symptoms associated with sea-sickness.

A. E. Barclay[2] has collected a number of examples of the intimate connection between central or psychic causes and immediate visceral reactions. By screening opaque meals in the stomach he was able to demonstrate the almost instantaneous reaction in the gastric tonus to certain psychic stimuli. To the banging of a door in the case of a highly nervous woman the immediate result was that the lower border of the stomach dropped three inches. A disgusting odour presented to another subject caused a drop of an inch or more in a normal stomach. On the other hand, the suggestion of a glass of beer to a workman was, as Barclay graphically describes it, sufficient to cause the stomach at once "to tuck up its skirts." Moderate rotations in the Bárány chair, as far as the faulty method of percussion can determine, cause in susceptible cases a fall of the stomach, but fail to do so in those who are not susceptible.

One thing, however, to bear in mind is that the visceral reflex, causing a drop in the stomach, will have its repercussion on the feeling of gastric disturbance. If there is in addition to this a direct local effect on the stomach, negligible in itself, by the movement of the boat, the visceral reflex will be re-enforced. As a result of this consideration we learn that the belly-binder so frequently advocated may itself give a little relief by restricting the stomach's freedom to drop, and may thus slightly mitigate the local symptoms.

The suggestible type.—The readiness with which certain subjects succumb to sea-sickness at the instance of almost any kind of signalizer, odour of the galley or even a view of the sea, the readiness on the other hand with which some respond to exhortation and mental diversion, calls for remark, and has led to the belief in the all-importance of the psychic factor. Certain subjects not usually sensitive to unpleasant odours are, nevertheless, nauseated and vomit to the specific odour of the galley, or of burnt engine-oil on board ship. Like those who vomit on ascending the gangway they respond to a suggestion which has an overwhelmingly unpleasant association. The odour of burnt oil or sight of the gangway reawakens vividly the memory of symptoms of sea-sickness which occupy the mind to the exclusion of everything else and pass from imagery to actuality.

The experienced ship's surgeon[3] always strongly advises his susceptible passengers to engage themselves in exercise, whether dancing (not waltzing), deck sports or drill, as soon as possible before lassitude sets in. If they are too overcome he has, of course, no alternative than to suggest the correct decubitus with reference to the ship's movement, his object then will be to mitigate as far as possible the effect of the ship's motion.

Ocular factor.—In endeavouring to analyse the symptoms of sea-sickness and refer them to their rightful source, it is inevitable that attention should be drawn to any features that can be defined or discriminated. As the avenue of perceived disorder the eye for this reason has been given a greater importance than it deserves. The unpleasant sensation of wavering uncertainty in the visual field cannot be ascribed to the eye, since the objective disorder, in so far as it is merely visual, is, in fact, negligible. The apparent disorder in the visual field is almost entirely due to the projection of the disorders of deviation, excited in the extra-ocular muscles by the vestibule, and may, for that reason, contribute to the general dilemma. In examples such as sea and air sickness, swing sickness, even train and motor-car sickness, the movement is never merely objective to the field of vision, the movement affects the body as a whole and its many receptors. Train and car sickness are instanced as typical examples of visual irritation only, yet the blind are not exempt from either motor or train sickness.

The function of the eye can be studied from two points of view, the first may be termed its intrinsic and purely exteroceptor function, when its movements are determined by light or light movement stimuli in the visual field, and also by objects in the visual field determined by interest. The second function may be termed extrinsic because the eye movements are not determined by objects in the visual field, light stimuli or objects of interest, but by impulses received from other parts of the body, which serve the function of equilibrium. The extra-ocular muscles receive functionally useful static and stato-kinetic impulses from the vestibule, the neck and body. The vestibule, in certain circumstances to be explained later, also sends impulses which cause disorientation to the eyes, neck, body and limbs. These reactions are called the primary reactions of vestibular dysfunction; that relating to the eye, the primary reaction of nystagmus.

Reverting to the examples of train and car sickness, emphasis is laid on the presence of nystagmus, which occurs on looking at the passing landscape. Nystagmus is generally associated with vertigo, and it is contended, therefore, that the symptoms of train and car sickness are the result of this ocular excitation. Nystagmus, so far as its merely optic, is almost immediately stopped by closure of the eyes or turning the eyes away from the landscape. Optic nystagmus, if vertiginous at all, is only slightly so. It is best elicited in the experiment of the rotating drum, which, the subject seated, follows with his eyes. He suffers no noticeable discomfort and does not complain of vertigo. It is clear that the eyes are alone involved, in their intrinsic capacity by light movement stimuli, the only capacity in which the eye's purely visual connection with symptoms associated with sea-sickness can be considered. The same is true of pseudo-optic nystagmus when the eyes follow a ping-pong game, the ocular movement is also intrinsic, but is now determined by interest.

If, however, nystagmus occurs in conjunction with any other equilibratory complication, disorientation cannot but be aggravated. When train and car sickness threaten the susceptible passenger he is unlikely, therefore, to continue watching the passing landscape and so increase the dilemma provoked by vestibular impulses. Imposed movements from without, as in train and car travel, which are characterized by positive and negative acceleration in angular movement, as in the rounding of curves, excite the vestibule to send impulses which pass to the eye, neck and trunk. The eye has then the double task of reconciling the extrinsic with the intrinsic information. It will be realized that with closure of the eyes the extra-ocular muscular movement does not, therefore, cease, but still contributes through the associated proprioceptor impulse an element to dilemma.

To bandage one eye, to keep both closed, or to paralyse accommodation with homatropine, is sometimes advised. We may assume that this advice is based on the belief that the passenger will then cease to bother with the effort to secure visual objective alignment. This will, however, have no appreciable effect on the extra-ocular responses from the vestibule and can have no possible effect on the responses of the neck, body and limbs. A possible disadvantage in certain cases from elimination of the visual field may, indeed, arise from the passenger's attention being directed to his subjective sensations.

The dysfunction of the vestibule, in its inability to register accurately a certain phase associated with a certain type of imposed movement, results in a discharge of impulses into motor channels which cause false subjective orientation. These impulses proceed from the vestibule by the posterior longitudinal bundle through the ocular nuclei to the extra-ocular muscles and exhibit the vestibular dysfunction by a constant tendency to deviation, which is registered consciously by proprioceptor impulses. Other impulses from the vestibule proceed by the vestibulo-spinal tract to the neck, body and limbs, causing involuntary postural deviation with a tendency to fall and involuntary kinetic deviation with a tendency to past point. They are all reactions of disservice where in their absence the body would have maintained stable equilibrium.

To the vestibule, therefore, the solution of the eye's small contribution to disorientation is referred, and that is why treatment dealing with the eye, as the organ of vision merely, under the conditions of sea and air travel, has little to recommend it. In view of this, it may, at this stage, be difficult to understand why the somewhat perplexing advice "to fix the eye on the far horizon" has so much in its favour. Only a closer consideration of vestibular function will make this clear.

The vestibule.—The vestibule is, in fact, "the nigger in the woodpile." It can influence all other factors of equilibration, but is itself uninfluenced by them; the way from it is a one-way route, there being no afferent nervous channel. Unlike the eye, or the end-organ of hearing, it is not an exteroceptor; it is said to have no cortical representation, but makes its behaviour, orderly or disorderly, perceptible only through the proprioceptor reactions it induces in the other factors in equilibration.

Whatever place the static organs of the saccule and particularly the utricle may have in disorientation, such as that experienced in a swiftly-descending lift, it is generally agreed that the semicircular canals are the chief means by which most of the externally imposed movements cause the seasick syndrome. The physical limitations of the endolymph restrict the scope of useful reflexes to angular movements of short duration only. If the movement is sufficiently rapid, and continues beyond a certain time, the endolymph betrays the defect of its inertia by continuing to move after the imposed movement has ceased. The excitation of the ampullæ and the passage of impulses continues so long as the lymphokinesis persists. The proceeding impulses to the eye, neck and body cause primary reactions to compensate the illusion of continued movement and, in consequence, disorganize the function of equilibration.

The severity of the reaction depends on the plane in which lymphokinesis takes place. If in a plane at right angles to the long axis of the body (horizontal lymphokinesis) the reactions are usually tolerable, as in waltzing and merry-go-rounds. If the movement passes through the plane of the long axis of the body the experience is decidedly unpleasant. There is the illusion of tumbling head over heels. The rarity of this experience, and therefore of the opportunity to learn its correct compensation, leads to disagreeable conflict.

Bárány, by means of the rotating chair, was able, by fixing the head of the subject in certain positions, to excite post-rotatory lymphokinesis in any plane, and was thus able to correlate the primary reactions with the particular plane. Caloric douching confirms the findings of the rotation tests in these respects and also with regard to the secondary reactions, in that these are far more likely to occur after vertical lymphokinesis than after horizontal. The knowledge of the effect on the plane of lymphokinesis enables the subject to increase or mitigate the severity of the reaction at will by a change of head posture.

The experimental change of posture is linked up with the positions learned on board ship by practical experience, which illustrate the same principle. The resemblance between the rotation tests and movement at sea is shown further in the ability to excite the secondary symptom without too severe a primary reaction. That is done by a succession of short-period rotations when the nystagmus may almost escape notice, the deviation of past pointing appears negligible, and the tendency to fall is still controllable. If this is, however, continued for half an hour or more, sickness supervenes. This means that the onset of sea-sickness in the ordinary person, uncomplicated by personal peculiarities, such as an apprehensive temperament, a ready suggestibility, or a body suffering from excessive indulgence, is a late sequel to a summation of recurring dilemmas.

The secondary reactions.—These represent a conflict between the muscular proprioceptor impulses from the primary reactions on the one hand, and the joint, pressure, skin and visual impulses unaffected by the vestibule on the other. The significance of the difference in sign reactions has only lately been fully recognized with regard to their bearing on treatment. The sympathicotonics show a rise of blood-pressure and of pulse-rate and an early tendency to vomit, while the vagotonics show a fall of blood-pressure and of pulse-rate and an early tendency to faint. The symptom reactions are very variable, but the more usual are headache, lassitude, blurred vision or a wavering visual uncertainty, " sinking in the stomach," nausea and vomiting.

TREATMENT

As lymphokinesis is the primary source of disorder ending in sea-sickness it follows that there is no direct means of inhibiting its post-rotatory movement. It is outside all nervous control, and while it reveals its dysfunction by pouring impulses into the eyes, neck, body and limbs, there is no reciprocity, no means by which these in turn can affect the movement of endolymph.

Our knowledge of experimental rotation explains why it is that, if the externally imposed movement of the boat cannot be stopped, it can in certain cases be modified by a change of head posture. In the more simple example of swinging or riding in a swiftly-moving lift, nothing so wards off the feeling of " sinking in the stomach " as by depressing the head, thus diminishing the pressure, positive or negative, of the otolith on the macula of the utricle. The advice to seasick passengers follows the same principle when they are recommended to take up certain positions in reference to the prevailing type of motion, roll or pitch, which, however, clearly meets with only moderate though quite noticeable success, since no one position can possibly cover all planes of semicircular canal excitation.

The soundest advice to all susceptible passengers is to take part in deck games, dancing and drill. It will require some persuasion to rouse them to do so because they so soon become victims to lassitude. When possible this measure has everything to recommend it. It cuts down the transitional period in the acquirement of immunity, and it is, in fact, an anticipation of what takes place more slowly, more painfully, but unconsciously, when the patient is left to himself. These exercises, then, have not only a general hygienic value, but, if carried out determinedly, modify directly the primary and, indirectly, the secondary reactions. The underlying object is to counteract the action of the vestibule on the eye, neck, trunk and limbs by the engagement in voluntary action of all these parts of the body, in some specific task, to monopolize, as far as possible, channels engaged in the passage to the soma of these disorderly impulses from the vestibule. Voluntary fixation of the eye, correction of the tendency to fall, and of the tendency to past point, to counteract, in fact, primary reactions of disorder, is the desired objective.

Malan[4] mentions the celerity with which the Italian airmen gain control of post-rotatory nystagmus. Experiments repeated on civilians support his observations. His attention, however, has not been drawn to a like ability in controlling the error of past-pointing and the tendency to fall. When the subject to these tendencies appreciates the error and makes allowances for them by the necessary motor modifications, he will, according to the extent of his success, monopolize the final common path to the exclusion of the vestibular disorientating impulses. In sea-sickness these primary reactions do not occupy much attention, because the mind is taken up with the more unpleasant secondary reactions, the seasick symptoms, nausea, vomiting, and so on. The important and not clearly appreciated fact is the effect that this inhibition has on the course of the secondary reactions, which are merely the result induced by irradiation of a central conflict of impulses. In short, the abatement of true sea-sickness depends upon side-tracking the primary reactions.

For the bad cases the chief recourse apart from general hygienic measures is to rely on drugs. It is imperative, however, that if drugs are resorted to, the physician shall appraise the type. Irradiation has peculiar ways of behaving, but as a rule reveals itself according to type, in one or two ways, either predominantly sympathetic or predominantly vagal. Of the two the vagal type, owing to its tendency to collapse, gives the ship's surgeon the greater anxiety. It sometimes occurs in subjects who, at first, suffered apprehension, which has not been allayed, and means an exhaustion of the sympathetic. Prophylaxis was obviously indicated in the first place to deal with the apprehension. More frequently, however, the vagal type appears without warning of any kind, and is as much a clearly defined variation in man as it is in the rabbit and dog,[5] which always responds to vestibular excitation by a fall of blood-pressure, and, in contrast to the cat,[6] which responds by a rise of blood-pressure. The vagal type is exceedingly sensitive to imposed movement. It is not, as a rule, amenable to suggestion, but does respond definitely to pressors and stimulants. Indiscriminate prescribing of secret remedies must therefore reflect on professional vigilance.

Only the broad principles of drug treatment can be touched on here. With the almost insuperable difficulty in securing controls, direction regarding the merits of particular drugs must appear dogmatic. The choice of sedatives among the chloretone, the chloralamide, barbitone and bromide groups is wide, and the choice should not be difficult. The choice of drugs for the treatment of vagotonia is wider and calls for still greater acumen and experience. The implication in the advertised proprietary drugs is that sea-sickness is a sort of entity, as if there was no such thing as type. The administration of the proprietary drugs, without a clear understanding of their ingredients, is inexcusable and reflects on professional skill.

The loss of reputation sustained by the latest German device, that of oxygen inhalation, with vaporized ephedrine and adrenaline was not undeserved, inasmuch as it was administered without the slightest regard for indication; it was, in fact, urged in its favour that the deck stewards themselves could handle it. Its frequent failure was, in fact, to be expected, applied, as it must have been, as often to the apprehensive type as to the vagal type, its proper and only indication.

It is perhaps too much to ask the susceptible passenger to undergo some rigid training to counteract vestibular disorder by daily increasing exercises of rotation. When, however, in the cases of those who, compelled to travel, cannot acquire immunity because they are always prostrate, then it is urged that they do undertake these exercises along with their daily dozen, and, if possible, in an ordinary revolving chair following the directions of head posture given below. In the absence of a chair, then by an exercise, popular with children, of walking quickly round a walking-stick held in the centre of the excursion, with the head bent forwards or backwards or on either side, beginning with two revolutions and increasing them from ten to twenty revolutions. The object is to present the head in as many planes as possible to cover all planes of excitation, such as occur in the various movements at sea. Immediately after each series of rotations the head should be brought to the vertical and the attention wholly occupied in correcting the ensuing errors of post-rotatory deviation.

First, the eyes should be fixed on some near and previously indicated object, secondly, the tendency to past-point after each series of rotation should be learned and then corrected. Thirdly, the direction of the tendency to fall (body deviation) after each series of rotations, should be appreciated and corrected. The last exercise offers considerable resistance, since the corrected movement is opposed to the illusory position of safety, which the deviation tendency is intended to correct. Between each series of rotations there should be a 5- to 10-second interval to allow of these corrections. If the subject eventually succeeds in overcoming the deviation errors in these primary reactions of vestibular dysfunction, he will have succeeded also in raising a barrier to the secondary reactions, the real objective of these rather tedious exercises. Lastly, every possible opportunity of swinging or riding in lifts should be used.

It is not possible to know beforehand what the specific reaction to movement at sea may be in the case of the apprehensive subject, since a sedative prophylaxis may cut out the early tendency to vomit to the signalizing action of boat movement, and may disclose the fact that he has but average susceptibility. The above exercises, in circumstances which do not excite apprehension, will thus determine his true susceptibility, and, in any case, will aid in reducing his excitability to the signalizer.

Sedative prophylaxis, when correctly administered to apprehensive subjects, not only allays anxiety but may actually increase appetite. The appetite will not be without effect on ketosis, since at the same time the sympathetic arrest of alimentary function is modified. There is good reason, therefore, for believing a subsequent need for alkalis and glucose will not arise during the voyage, except to deal with post-vomiting ketosis.

In conclusion, advertised remedies, from the more innocent kind, such as abdominal belts, mercury pendants, to the more considered treatment by glucose and alkalis, by the mastoid anodes, by the last and most modern device of oxygen and vaso-constrictor inhalation, all, even the crudest, have had an astonishing vogue, like all new remedies, time and more careful experiment disposing of most. A great many of these remedies have been given extended trial without prejudice, but there were few of them whose pretensions were, if not absurd, extravagant. The results, as was to be expected, when given indiscriminately, were disappointing. Out of the limbo of these methods and drugs, however, a tempered opinion remains of the value of a great many, but all of them makes imperative a study of the individual case.

If the nature of sea-sickness, its connection with the disorders of equilibrium, and the acquirement of immunity, is clearly comprehended by the ship's surgeon he will realize the extent of his powers and of his limitations. If he goes to the trouble of examining his patients with the object as far as possible of classifying them according to type, whether sympathetic, vagal, suggestible or self-indulgent, he may be expected to render them a very real service. The details of treatment in the choice of drugs, the correct posture to be adopted, or the kind of games and exercises to be pursued, and the dietary, can then be safely left in his hands.

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The Subcutaneous Tuberculin Test

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IN this series of 106 cases the diagnostic value of the subcutaneous tuberculin test has been compared with radiographic evidence in diseases of the lung. The cases were those of suspected pulmonary tuberculosis without any tubercle bacilli found in the sputum.

The subcutaneous tuberculin test is the subcutaneous injection of increasing amounts of old tuberculin, at intervals of from four to seven days. In adults, with slight symptoms and signs, I inject the following amounts:—0·0001 c.cm., 0·001 c.cm., 0·005 c.cm., and 0·01 c.cm. For children under fifteen, with slight signs and symptoms, the first dose is 0·00001 c.cm., and for children and adults with signs of active disease in the lungs the initial dose is one hundred millionth of a c.cm. Here the dose is apparently infinitesimal, but in a girl of eight with tuberculous glands in the neck I have seen a rise of temperature of 4° F. after an injection of one millionth c.cm.

The tuberculin test has a double value. A tuberculous individual reacts to an amount which has no effect upon a healthy person. Koch regarded 0·025 c.cm. as the amount which usually produced symptoms in healthy adults. Therefore the value of a reaction as indicative of tuberculosis is in inverse proportion to the amount injected. A reaction to a small amount is of greater diagnostic value than a reaction to a larger amount. Conversely, the absence of a reaction to a large amount of tuberculin is of more value in excluding tuberculosis than the absence of a reaction to a small amount. In this series the patients were adults with slight symptoms and/or signs suggesting pulmonary tuberculosis. In pulmonary tuberculosis, without tubercle bacilli in the sputum, it is possible to compare tuberculin reactions with radiographic changes, but in all forms of tuberculosis, especially with the lymphatic system, the tuberculin test stands alone.

Reactions.—A tuberculous subject may give three types of reaction to tuberculin :—(*a*) local, at the site of injection; (*b*) general, a rise of temperature; (*c*) focal, an exacerbation of signs in the tuberculous lesion. In the subcutaneous test we look for a rise of temperature only. For that reason the test can only be carried out in afebrile patients, or those in whom any temperature has been subdued by rest. There are two degrees of reaction. A weak reaction is a rise of temperature of from ½–1° F. above the mean temperature. A strong reaction is a rise of temperature of over 1° F. A weak reaction is not to be accepted as specific unless confirmed by a strong reaction to a larger dose.

In the following series of cases a weak reaction (+) is only recorded alone when thus confirmed by a strong reaction (+ +) to a subsequent and larger dose. When not so confirmed the subsequent reactions are recorded. In some cases it is advisable to inject normal saline in place of tuberculin to exclude the possibility of a psychological temperature reaction, which can and does occur. A few cases gave atypical reactions—a weak reaction to all strengths of tuberculin. These have been recorded, but I have no explanation to offer unless they be cases of rapid immunization. Elsewhere[1] I have given in detail the full technique of the subcutaneous test.

Results.—All the cases were tested with tuberculin, and the reactions in relation to the amount injected were as follows:—

106 *Cases: Reactions to tuberculin*

1 0·0001 c.cm.	2 0·001 c.cm.	3 0·005 c.cm.	4 0·01 c.cm.	5 No reactions.
13	39	30	12	12

The reactions thus fall into five groups, and those in the first three groups are most indicative of tubercle. Let it be assumed that the tuberculin test is infallible, that all cases reacting to amounts up to 0·005 c.cm. are tuberculous, and that cases only reacting to 0·01 c.cm., or not reacting at all, are not tuberculous. We should then have 82 cases of tuberculosis, and 24 cases that are not tuberculous.

Radiographic evidence.—All the cases were X-rayed, and from each radiogram I have taken the most abnormal sign, with the following results:—

106 *Cases: Radiograms showing the following*

1 Apical Nodules.	2 Mottling.	3 Increased Apical Striation.	4 Root Shadows + and/or Peribronchial Thickening.	5 Signs Indefinite or Normal.
19	15	49	16	7

The radiographic signs thus fall into five groups, and those in the first three are most indicative of pulmonary tuberculosis. Let it be assumed that the radiographic results are infallible, and that all cases in groups 1, 2 and 3 are tuberculous, and that cases in groups 4 and 5 are not tuberculous. We should then have 83 cases of tuberculosis, and 23 cases that are not tuberculous.

The figures obtained from the foregoing assumptions concerning the diagnostic value of tuberculin and of radiographic signs suggest *a priori* an extraordinary degree of correlation between the two tests. Such a correlation would be too good to be true, or too true to be good. In casting about for a method of presenting these cases I sought to determine to what extent there was any correlation between the five groups of signs in the two tests. The results, together with the ultimate diagnosis, are set out in the following diagram.

RADIOGRAPHIC SIGNS

Reactions.		1		2		3		4		5	
		T	O	T	O	T	O	T	O	T	O
0·0001 c.cm.	T	1		4		5		2		1	
	O										
0·001 c.cm.	T	9		7		17		4		2	
	O										
0·005 c.cm.	T	8		4		11		3		1	
	O						1		1		1
0·01 c.cm.	T					2					
	O						4		4		2
No Reactions	T	1		1							
	O				1		8		1		

T = Tuberculosis. O = Other Diseases.

(A) *Correlated Group.*—In the upper left segment of the plan, within the dotted line, are 67 cases. In these cases there was correlation, as the radiographic signs of apical nodules, mottling, or of increased apical striation were associated with a febrile reaction to 0·0001 c.cm., 0·001 c.cm., or 0·005 c.cm. of tuberculin. Of these cases all except one were diagnosed as pulmonary tuberculosis.

(B) *Uncorrelated Group.*—In the lower left segment of the plan are 17 cases where X-ray indications of pulmonary tuberculosis were not endorsed by the results of the tuberculin test. Of these 17 cases only

4 were diagnosed as pulmonary tuberculosis.

(C) *Tuberculin Group.*—In the right hand segment are 22 cases where X-ray signs were not indicative of tubercle, and in that group 14 cases were diagnosed as pulmonary tuberculosis. Here diagnosis mainly depended on the tuberculin test, and this I have called the Tuberculin Group.

(A) *Tuberculin Reactions in the Correlated Group*

Cases.	0·0001 c.cm.	0·001 c.cm.	0·005 c.cm.	0·01 c.cm.
	(*a*) Radiograms show Apical Nodules.			
1	+ +			
2- 3	−	+ +		
4–10	−	+		
11–16	−	−	+ +	
17–18	−	−	+	
	(*b*) Radiograms show Mottling.			
19	+	+	+	
20	+			
21	+	+	+ +	
22	+	+	+	+
23–27	−	+ +		
28–29	−	+		
30–32	−	−	+ +	
33	−	−	+	
	(*c*) Radiograms show Apical Striation +.			
34–35	+ +			
36	+			
37	+	+	+ +	
38	+	+	+	+ +
39–51	−	+ +		
52–55	−	+		
56–66	−	−	+ +	
67	−	+ −	+	

Of the 67 cases 66 were diagnosed as pulmonary tuberculosis, and on Philips' classification were grouped as follows :—

L_1	L_1s	L_1S	L_2s	L_2S	L_3s
5	38	1	6	1	15

In 14 of these cases no obvious physical signs were detected in the chest suggesting pulmonary tuberculosis.

In *Case* 12 the sputum had been inoculated into four guinea-pigs, of which one developed tubercle.

Case 17 gave a weak reaction to 0·005 c.cm. tuberculin, but a focal reaction appeared in one of the cervical glands, which became enlarged and tender. The reaction passed off within a week.

In *Case* 18 tubercle bacilli were found in the sputum later on after repeated examinations.

Case 40 gave a strong febrile reaction to 0·001 c.cm. tuberculin, and also showed a focal reaction at the right apex, where crepitations appeared and remained for a few days.

Diagnosed as Non-Tuberculous

Case 67 was diagnosed as debility from pyorrhœa; air entry was weak all over the chest, with slight dullness at the right apex. Radiogram showed slightly increased striation in right upper lobe. There was a weak reaction to 0·001 c.cm. tuberculin, but none to a second injection of the same amount. After 0·005 c.cm. the temperature rose to 99° F. Complement fixation test for tubercle was negative, as also was the Wassermann reaction.

(B) *Tuberculin Reactions in the Uncorrelated Group*

Cases.	0·0001 c.cm.	0·001 c.cm.	0·005 c.cm.	0·01 c.cm.
	(*a*) Radiogram shows Apical Nodules.			
68	—	—	—	—
	(*b*) Radiogram shows Mottling.			
69	—	—	—	
70	—	—	—	—
	(*c*) Radiogram shows Increased Apical Striation.			
71–72	—	—	—	+ +
73–76	—	—	—	+ +
77	+	—	—	—
78	—	—	—	
79–84	—	—	—	—

In this group radiographic evidence in favour of tubercle was opposed to the results of the tuberculin test. Of the 17 cases 4 were diagnosed as tuberculous. It is therefore necessary to indicate not only why four cases, despite the tuberculin reaction, were diagnosed as tubercle of the lung, but also why 13 cases, despite the X-ray evidence, were diagnosed as non-tuberculous.

The first three cases are of particular interest because they are the only cases in the series where apical nodules or mottling—the strongest X-ray suggestions of tubercle except excavation—were not endorsed by the tuberculin test. Of these three cases (68–70) two were diagnosed as tuberculous and one as non-tuberculous.

APICAL NODULES AND/OR MOTTLING

Diagnosed as Pulmonary Tuberculosis

Case 68.—Healed tuberculosis L_1. A history of pleurisy 5 years previously. No abnormal physical signs in chest. Radiogram showed " Striations up to both apices, and some(?) nodules showing there."

Case 69.—L_2. Only three injections of tuberculin. Tubercle bacilli reported in sputum 2½ years previously. Moderate dullness left apex. Radiogram : " Much mottling left upper lobe." Eighteen months later a traumatic pneumothorax, and within three years death.

Mottling Diagnosed as Non-Tuberculous

Case 70.—Bronchial asthma. Radiogram showed : " Striation and mottling over left lung." Physical signs in chest of asthma, which had appeared after " gassing " in the Great War.

RADIOGRAM SHOWS INCREASED APICAL STRIATION

In the other 13 cases in this group the X-ray suggestion of tuberculosis did not exceed increased apical striation. Of these cases two were diagnosed as healed tuberculosis—L_1.

Apical Striation Diagnosed as Tuberculosis

Case 71.—L_1. Clinically, slight dullness right apex, and definite dullness left apex. Radiogram : " Striations towards both apices, but no definite nodules."

Case 72.—The radiogram showed : " Increased striation at both upper lobes, especially at the left upper lobe." Clinically, there was slight dullness at the right apex. Tubercle bacilli in the sputum had been reported seven months previously.

Apical Striation Diagnosed as Non-Tuberculous

Case 73.—Post-pneumonic fibrosis. Clinically, slight dullness over right lower lobe. Radiogram : " Very suspicious towards right apex." Tubercle complement fixation test—negative.

Case 74.—Physical signs of chronic bronchitis. Radiogram : " Striations towards both apices. Looks like T.B." Complement-fixation test for tubercle—negative, and Wassermann reaction negative.

Case 75.—Old gunshot wound of lung. Radiogram showed: " Striation towards both apices : (?) small nodule right apex."

Case 76.—Physical signs of emphysema in a man aged 53. Radiogram : " Rather marked striations, but no evidence of any nodules."

Case 77.—Chronic malaria. No abnormal physical signs in chest. Radiogram : " Fairly well marked striations but no definite nodules showing at apices." Gave a weak reaction (99·6° F.) to 0·0001 c.cm. tuberculin, but none to following injections.

Case 78.—Physical signs of chronic bronchitis. Radiogram : " Marked peribronchial thickening. Very marked striation throughout both lungs, especially towards right base. Looks more like a chronic bronchitis." Only three injections of tuberculin—no reaction.

Case 79.—Non-tuberculous fibrosis. Slight dullness at right apex. Radiogram : " Slightly suspicious at right apex."

Case 80.—Physical signs of chronic bronchitis. Radiogram : " Marked striation towards both apices, but no nodules."

Case 81.—Physical signs of chronic bronchitis. Radiogram : " Increased fibrosis in both lungs."

Case 82.—Neurasthenia. No abnormal clinical signs in chest. Radiogram : " Enlarged glands right root. Fine fibrosis left upper lobe below clavicle."

Case 83.—Dyspepsia. Slight dullness right apex, moderate at left. Radiogram : " Increased fibrosis in left upper lobe."

Case 84.—Gastritis. No clinical signs in chest. Radiogram : " Marked striations throughout lungs. Left apex looks rather suspicious."

(C) *Tuberculin Reactions in the Tuberculin Group*

Cases.	0·0001 c.cm.	0·001 c.cm.	0·005 c.cm.	0·01 c.cm.
	(*d*) Radiogram shows Increased Root Shadows and/or Peribronchial Thickening.			
85–86	+ +			
87–89	—	+ +		
90	—	+		
91–93	—	—	+ +	
94	—	—	+ +	
95–98	—	—	—	+ +
99	—	—	—	—

In this group the X-rays signs did not suggest pulmonary tuberculosis; and here, in comparing the two tests it should be noted that whereas an absence of X-ray evidence does not necessarily exclude pulmonary tuberculosis, an absence of febrile reaction to an adequate dose of tuberculin should exclude active tuberculosis. Moreover, an area of caseation in the lung must reach a size of 4 c.mm. before it throws a corresponding shadow, whereas long before any shadow is thrown a small dose of tuberculin may induce a positive reaction. Of the above fifteen cases, the first nine (85–93) were diagnosed as pulmonary tuberculosis, classified as follows :—

ROOT SHADOWS +, AND/OR PERIBRONCHIAL THICKENING

Diagnosed as Tuberculous.

L_1.	L_1s.	L_3s.
1	7	1

In these nine cases physical signs in the chest suggested a diagnosis of pulmonary tuberculosis.

Diagnosed as Non-Tuberculous.

Case 94.—Post-influenzal fibrosis. No physical signs of tubercle. Radiogram : " Increased fibrosis at right lower." Complement fixation test for tubercle negative, and Wassermann test negative.

Case 95.—Post-pneumonic fibrosis. Dullness most marked left lower lobe. Radiogram : " Increased fibrosis in both lower lobes."

Case 96.—Old empyema scar over left lower ribs at back. Radiogram : " Marked fibrosis in left lung."

Case 97. — Emphysema. Chest barrel - shaped. Radiogram : " Marked peribronchial thickening, especially in left lung."

Case 98.—Effects of gas in Great War. Slight dullness right apex. Radiogram : " Well-marked peribronchial thickening, but both apices seen fairly clear. Apparently no evidence of T.B."

Case 99.—Neurasthenia. No abnormal physical signs in chest. Radiogram : " Peribronchial thickening, but no mottling in upper lobes."

In the remaining cases, where the radiograms were either indefinite or showed nothing abnormal, the reactions to tuberculin were as follows :—

Cases.	0·0001 c.cm.	0·001 c.cm.	0·005 c.cm.	0·01 c.cm.
	(e) Radiogram Indefinite or Normal.			
100	+ +			
101–102	−	+ +		
103	−	−	+ +	
104	−	−	+ +	
105–106	−	−	−	+

CASES WITH NO RADIOGRAPHIC SIGNS

Diagnosed as Tuberculous

The first four cases were diagnosed as pulmonary tuberculosis as follows:—

L_1s.	L_3s.
2	2

In these four cases the physical signs in the chest also suggested pulmonary tuberculosis.

Diagnosed as Non-Tuberculous

Case 104 gave a strong reaction to 0·005 c.cm. tuberculin. There were no abnormal physical signs in the chest, and, as the radiogram showed nothing abnormal, a diagnosis of pulmonary tuberculosis was impossible. A tuberculous focus may have been present, but if so it was not detected, and the case was diagnosed as Neurasthenia.

Case 105 was emphysema.

Case 106 was a case of neurasthenia, with slight dullness at the right apex.

SUMMARY

When tubercle bacilli are not found in the sputum an infallible diagnosis of pulmonary tuberculosis cannot be made either by the tuberculin test or by radiograms alone. In many cases the ultimate diagnosis, whether right or wrong, must be made by these tests in conjunction with history, symptoms, and physical signs in the chest. Where no abnormal physical signs can be detected diagnosis in the main depends on tuberculin in conjunction with radioscopy and radiograms. Assuming the final diagnosis to have been accurate then the two tests work out as follows:—

Radiograms

(1) Of 19 cases showing apical nodules, 19 were tuberculous.

(2) Of 17 cases showing mottling, 16 were tuberculous.

(3) Of 48 cases showing apical striation, 35 were tuberculous.

(4) Of 15 cases showing peribronchial thickening, 9 were tuberculous.

(5) Of 7 cases showing no X-ray signs, 4 were tuberculous.

Tuberculin Reactions

(1) Of 13 cases reacting to 0·0001 c.cm., 13 were tuberculous.

(2) Of 39 cases reacting to 0·001 c.cm., 39 were tuberculous.
(3) Of 30 cases reacting to 0·005 c.cm., 27 were tuberculous.
(4) Of 12 cases reacting to 0·01 c.cm., 2 were tuberculous.
(5) Of 12 cases giving no reaction, 2 were tuberculous.

Comparison

Of 82 cases with tuberculin reactions indicative of tubercle, 79 were tuberculous (96 per cent.).

Of 84 cases with X-ray signs indicative of tubercle, 70 were tuberculous (83 per cent.).

Of 24 cases without tuberculin reactions indicative of tubercle, 4 were tuberculous (16 per cent.).

Of 22 cases without X-ray signs indicative of tubercle, 13 were tuberculous (59 per cent.).

CONCLUSIONS

The subcutaneous tuberculin test is often indispensable in diagnosing diseases of the lung. The tuberculin test may give the correct interpretation of radiographic evidence. X-ray evidence may give the correct interpretation of the tuberculin test, especially in cases reacting to 0·005 c.cm.

Reference

[1] Sutherland, Halliday: "Pulmonary Tuberculosis in General Practice." Cassell & Co., London, 1916.

Temperaments and Senses

By E. A. BARTON, M.R.C.S., L.R.C.P.

A VERY close study of the sick during nearly half a century leaves the impression that certain diseases are often associated with a definite and characteristic mental attitude; and that this attitude is not merely a coincidence is proved by the frequency of this association. We are so ignorant about what constitutes temperament, how it can be changed and altered by environment or disease, and how a normal personality can become abnormal as the result of the invasion of some bacterial poison, or modified by the excess or deficiency of some essential hormone. It is easy to account for a definite temperament in a growing child suffering from some congenital misfortune which limits its capacity to respond completely to its environment, and thus tends to warp the mental outlook in consonance with its surroundings; but in the adult the connection between disease and temperament is so elusive, and bears, so far as I know, so little scientific basis of explanation that it may be worth while to record for what they are worth the vague and tenuous hints borne in on one who has taken a special interest in the matter.

To begin with an obvious case. Who has not been struck by the singularly pleasant outlook of many patients with slight tuberculous infection. How artistic is the mental attitude, what a charming companion he makes. His mind runs to beautiful things; he is often an artist, poet or musician, but is always a dreamer of charming dreams. Something of a nuisance perhaps in his political views, with his glorious altruism, his desire is that all should have the best of everything, at the same time quite regardless of the means of such attainment. And when he gets an exacerbation of his disease note his splendid optimism, his plans for life, "As soon as I am well again"—for he is always on the edge of recovery. And this optimism in many cases continues to actual death. A young man dying of advanced tuberculosis, who was an accomplished skater, said to me: "If the frost holds good I will be with you on the lake on Sunday." This was on a Tuesday; on Saturday he was dead. Such optimistic cases are not the invariable rule in tuberculosis, but there are far too many such for the condition to be a mere coincidence, and therefore one is correspondingly impressed with the feeling that the toxins of the tubercle bacillus must in some way be responsible for this illogical optimism. The tuberculous in the early or even quiescent stage are alleged to be rather more sexually capable than normal. There may be something in this, and from cases observed I am inclined to think that this may be so.

Now for the reverse picture: the mental state is profoundly altered and depressed in all streptococcal infections, and this without any reference to pain. The suicide statistics rose considerably during some of the influenza epidemics associated with streptococcal complications, as most of them were, and I have most vivid memories of whole families convalescing after influenza during the serious epidemic in 1890 weeping together over the fire because they were so miserable. Even in the case of a small localized centre of infection, such as a whitlow or a boil, I have seen a well-marked melancholic state which entirely disappeared within half an hour of the relief of tension; indeed, in my own experience of a small infection, I was aware of a mental depression of a deep and very real character impossible to overcome by any logic, and quite out of proportion to the slight pain.

With regard to malignant disease the associated melancholy cannot be dissociated from the concomitant suffering, and the all but certainty of death as the only relief, so that any observation is valueless. Perhaps the most prominent and obvious condition of "melancholy" arises from a state of jaundice: so obvious indeed that it was well recognized by the ancients and hence the word. Most of us are familiar with the yellow thoughts and morbid outlook which accompany even a small amount of bile in the circulation, but when the jaundice is profound the patient often gets into a state of depression from which it is very hard to arouse him.

Let us take next the irritability and emotionalism in Graves' disease, which assuredly must be the result of the excess of thyroid hormone in the circulation. This view bears little chance of refutation when we observe the placid state of women with myxœdema, or the "Christian" temperament of the cretin. How this acts we are totally ignorant, but in the future it may be possible to stimulate the backward boy at school or inhibit partially the thyroid activity of the tempestuous. All that is certain is that alteration in the character of the blood exerts some obscure influence on the higher centres. An instance of this is prominent in gout, a disease fast disappearing from the list of common disorders. Here the chronic sufferer becomes for some days before the onset very irritable, restless, and captious. Everything is wrong; he is so impossible to please that his immediate associates are fully aware of what is impending. This mental state lasts during the fullness of the attack, but when the joints are well again he reverts to his usual temperament, becomes quite tame, and will "eat out of one's hand."

I have a vague idea, though without a sufficient number of cases to be certain, that there may be some connection between the observed cheerfulness of children with poliomyelitis and those of tender years paralysed without associated infection. The infection by the organism responsible for epidemic encephalitis also changes the temperament; and this is so frequently seen in cases that have recovered as to be most impressive. The delightful man becomes brutal, the clean-minded man dirty, and the calm personality violent.

Another curious alteration in personality and character due, I feel sure, to some change in internal secretion, is observable in many men approaching advanced years, noticeable not necessarily in those of low intellect, but frequently in those of unusually high mental attainments whose life-work is proof of their profound knowledge. Their sense of humour is altered; they relate pointless stories of the dirtiest nature with the utmost relish, just like an evil-minded schoolboy, and appear to obtain the greatest amusement. This condition must in some measure be due to failure or excess of an internal secretion, and in the cases of this kind examination has shown definite enlargement of the prostate. In these men keen desire persists long after capacity is dead, and I am sure that in this fact lies the solution of many of the unpleasant police cases in which some of the present-day papers wallow. Such humour smacks of the primitive races, among which, apart from horseplay, the lumbar pleasantries are the only form which appeal to them.

Now to consider the influence on temperament consequent on physical shortcomings of a congenital nature. The failure of complete reaction to surroundings, which must of necessity exist in any limit to the full use of our senses generally, takes a course corresponding to the deficiency in the sense involved and also to the extent of such limitation. An extreme example is a child with deaf-mutism—mute because deaf, in whom the senses of sight and touch take over as far as possible the grave handicap of want of hearing. The difficulty of getting through to the " soul " of the child exercises all the ingenuity of the parents. Such a child plays alone in a small world of which he is the centre, the other inhabitants existing to tender to his wants and supply his needs. It is most difficult to correct such a child, for the distinction between right and wrong is a matter impossible to explain to him. And yet the child is no more unhappy than any of us who are in full possession of five senses only, out of the multitude of those lost through atrophy for want of use during the upward stages of our evolution. Soon we shall have but four, as the fast-diminishing sense of smell becomes less and less since man rose from four legs to two, and has used sight rather than his nose for hunting and for the selection of his mate. Hence the development of sight in man to a far higher degree than that of most animals, the deer and the mountain sheep being well-marked exceptions. We do not miss a sense which we have never enjoyed any more than we miss the use of the pineal eye. Such senses, of which we have no cognizance and we ignorantly dub instincts for want of a better term, we see and marvel at in the lower animals, birds, and fish; they are, however, definite senses, probably with sense organs and possibly with centres of response somewhere in their nervous system. What has become of our mass-control sense, so obvious, for instance, in the crowded evolution of starlings in autumn, where, when closely packed, each bird has but a cubic foot of space in which to fly, and in which narrow confine the penalty of failure to keep accurate station is collision and death. No bird leader could possibly be seen by all at once, and the transmission of control can only be received by some highly-developed sense of which we have no conception. Yet they move instantaneously and synchronously or they would collide. Take, again, the orientation sense of cats and birds, the antennæ sense of the oak-egger moth, and numberless other instances which occur to the mind of any close observer of Nature. We do not miss these senses, never having enjoyed them. What they are we do not know, any more than does the deaf-mute miss the senses of which he is deprived, or we ourselves miss the opulence of the fourth dimension.

The limitation to perfect vision has another definite complex according to the degree and character of the deficiency. A child with uncorrected hypermetropia is looked on as stupid at school and starts life handicapped with an inferiority complex in consequence. It is only when the headaches are prominent and complaint is made, or when there exists a definite strabismus, that interest is taken and correction made. Then it is that the failure often turns out an average or even superior intellect. Very different, however, is the state of the congenital myope. In the myopic state the visual acuity is bounded by a few feet, the retinal image of objects in this area being larger than that in the normal eye. Printed type therefore is larger to him than to those of normal vision, and as a result he learns only from the printed word, which becomes the absolute law of his life. Seeing nothing sharply beyond his limited horizon he learns little by observation, nothing by experience, and his main source of learning is print. So that this child is often from the examination point of view clever : he passes his school life at the top of his form. He has not any interest in athletic games for he cannot see, but in reading, mental problems, such as chess, cards and puzzles, he finds relaxation—all within a few feet of his eyes. What is the result ? He grows up saturated in precedents culled from books which are the principal contacts he has with the outside world. His assurance in the certainty of truth in the written word is often pathetic, leading sometimes to an argumentative and negative complex in proportion to his inexperience of physical facts. I recall the occupation of the various witnesses in the Vaccination Commission and noted how often the " Anti's " were cobblers or tailors or men whose business was of a close-viewed and sedentary nature, obviously myopes physically and mentally. If, however, the myopia is corrected early in life the deficiency is largely counteracted, though even then there is a definite myopic complex, though less in degree.

I presume that the reason why we notice in the streets of London such a high proportion of Chinese, Japanese, and Indian students wearing high minus glasses is that those seen are the men who have passed high examinations in their own country by the very reason of their myopia, which made reading their main occupation. Hence they often take up law or literary work and compete successfully with our students here. But with them there is the added advantage, which very few of us possess, of a hereditary and retentive memory handed down to them during thousands of years in their own country. For thousands of years all learning in their own countries has been handed down by means of speech only, retained and transmitted to memory. Their religion, their laws, their stories and legends—all handed down by word of mouth. To know the whole Koran by heart and word perfect is not very unusual amongst the Mohammedans. Now that this knowledge has recently been fixed and transferred to type, and print is disseminated generally, the myope has the advantage. Hence the Eastern intelligentsia are so often myopic.

If the average person, confronted with the alternative of complete blindness or complete deafness were asked to decide which horror he would dislike the least, most people would say that complete deafness was preferable to complete blindness. And yet the difference in the temperament between the blind and the deaf is very marked. The deaf man sits alone reading; conversation goes on round him but he is left out of it. He goes on his silent walks alone, or if accompanied is still silent. A few try to interest him by talking on their fingers, but he feels that such is but a condescension and dislikes it, himself using finger language only for necessities, and often finding it easier to write on a tablet. He tries to get some idea of the current of talk by observing lip movements, but gets hold of the wrong ideas and hates himself when he sees surprise at his remarks. After a time his speech slurs and, not hearing his own voice, becomes difficult to understand. This he is keen to notice and at length talks less and less, retreating into himself, becoming a recluse and leading a very solitary life, miserable for the want of contact with those around him.

But the blind! He delights in music and in conversation, and is often a most desirable addition to the table by reason of his wit and cheerfulness. Everyone tries to help him, which he generally resents, and prefers people to take no notice of his shortcomings even if he does blunder in strange doorways. He does not like people to be sorry for him, for he is in close mental contact with those about him, and gets far more out of life than the totally deaf. True he cannot read, but the Braille books and newspapers of the present day go far to discount this deprivation. So that the totally blind are usually more happy than the totally deaf.

We see, then, that temperament is an unstable and plastic quality, largely to be moulded in the young either by their surroundings or by example, never quite fixed, and liable to be influenced or even altered by disease or physical infirmity. The cheerful temperament is a priceless possession, for when all is said happiness is alone the *summum bonum* of our existence; wealth cannot purchase it, nor health ensure it. It depends for the most part on our own inner consciousness, our outlook on life, our faith in the future, and, above all, on the good companionship of our fellow-men.

Some German Spas

BY R. SCOTT STEVENSON, M.D., F.R.C.S.E.

GERMANY is a country of spas—they number more than 1,200, of one kind or another, although most are merely a hotel with a mineral spring attached. Just as the English paterfamilias has been accustomed for a generation or two now to regard a holiday as meaning a visit to the seaside, so has his German contemporary looked upon his annual "cure" at a spa as his holiday. Recent years have seen great developments at the British spas, and the present propaganda to send British patients to British spas has more than patriotism to commend it. Although in the treatment of rheumatism the English spas are second to none in the world, as they ought to be in the treatment of that devastatingly English disease, nevertheless there are certain German spas that will repay the attention of British medical practitioners and British patients, not only because of the qualities of the waters with which Nature has endowed them, but also because the physicians at these spas have specialized in the treatment of certain diseases which are not commonly treated at British spas.

When it was suggested recently that I should pay a visit to some German spas I accepted on condition that I visited spas whose waters contained natural carbon dioxide (which is not found naturally in any English waters) and which made a speciality of diseases other than rheumatism. I was invited, therefore, to visit a group of spas complying with these conditions, namely, Neuenahr, Homburg, Nauheim and Kissingen, the furthest of which is only 18 hours from London by rail and boat. At all of them English people are cordially welcomed, and everyone I met understood English.

BAD NEUENAHR

Neuenahr is a charming little town in the romantic valley of the Ahr, a tributary of the Rhine, not far from Bonn. The town is only a mile from the springs where the well-known mineral water Apollinaris is bottled, the holding company of which is still, I believe, an English concern. Neuenahr has five mineral springs, of which the chief constituents are a small amount of sodium bicarbonate and free carbon dioxide. This spa has long had a reputation for the treatment of diabetes, and since the discovery of insulin, the physicians there have kept themselves up to date and are in touch with all the latest developments of dietetic and insulin treatment. In addition, however, Neuenahr specializes in the treatment of gastro-intestinal disorders, and particularly in diseases of the gall-bladder; some of the radiograms of the gall-bladder and of duodenal ulcer which I was shown here were among the very best I have ever seen. There are 136 bathrooms at the thermal bathing house, on the level, and most of the modern methods of spa treatment have been installed.

The best season at Neuenahr is May, June and September—in July and August it is rather crowded; but there are many amusements, four concerts daily by the Kur orchestra, theatre once or twice a week, cinema, and particularly good tennis courts, where an international tournament is held each year. At the Kur Sanatorium 15 marks a day (the exchange is 15 marks to £1 at present) covers board, special diet and medical attendance; baths cost 2 to 3 marks each, so that the expenses of a stay here should not be more than 18 marks (say £1 : 6 : 0) a day. At the best hotel the inclusive charge was 10 marks a day, but, of course, that did not include medical attendance.

BAD HOMBURG

Homburg is inclined to live on its past glories, and every one I met there spoke, with a tear in the eye, of King Edward VII and the great days when he stayed at Ritter's Parkhotel every year and even his hat was called after the town. Of course, long before King Edward's day Homburg was a fashionable spa, notorious for its gambling, which was presided over by the brothers Blanc, one of whom afterwards went, in the 'seventies, to Monte Carlo and founded the casino there. Homburg's chief disadvantage to-day, however, is that it is almost too near Frankfurt, and the citizens of that famous financial centre find it an

DIET-MENU of Bad Homburg, ordered by the Medical Society.

What is Written on the Card, Each Guest can put Together the Diet which has been Ordered by the Doctor.

	Price.
Coffee Hag - - - - - -	
Malt coffee - - - - - -	
Cocoa - - - - - - -	
Porridge - - - - - -	
Toast - - - - - - -	
Stale white bread - - - -	
Brown bread - - - - -	
Biscuit of Friedrichsdorf - - -	
Diabetic biscuit only when ordered.)	
1. *Soup.*	
a) Porridge cooked in water, strained without anything in it - -	
b) Bouillon with egg, etc. - -	
....	
c) Soup and broth - - - -	
2. *Egg Meals.*	
a) Boiled eggs - - - -	
b) Buttered eggs - - - -	
c) Pancakes - - - - -	
d) Omelet - - - - -	
3. *Fish.*	
a) Boiled fish - - - -	
(With fresh butter) - - -	
b) Baked fish - - - -	
4. *Meat.**	
a) Lean meat - - - -	
Cooked - - - - -	
Roasted - - - - -	
Grilled - - - - -	
b) Fat meat - - - - -	
(Mutton, pork, duck, goose) -	
All meat can be served without sauce.	

	Price.
5. *Potatoes, etc.*	
(a) Mashed potatoes - - -	
(b) Boiled potatoes - - - -	
(c) Rice - - - - -	
(d) Maccaroni or vermicelli - -	
6. *Vegetables and Salads.*	
(a) Fine vegetables - - - -	
....	
Strained - - - - -	
Steamed in butter - - -	
Cooked in salt water - - -	
(b) Plain vegetable - - - -	
....	
Steamed in butter - - -	
Cooked in salt water - - -	
(c) Green salad with lemon - -	
7. *Stewed Fruit.*	
(a) Stewed fruit with sugar - -	
(b) Stewed fruit without sugar - -	
(c) Strained - - - - -	
8. *Fruit.*	
....	
....	
9. *Sweets.*	
(a) Milk pudding - - - -	
(b) Pie, pudding or creams - -	
(Without raisons, almonds, lemon peel, etc.)	
10. *Cheese.*	
(a) Cheese with a little cream - -	
(b) Cream cheese - - - -	
(In the cooking of the dietetic meals spices are not used. Pepper, onion, etc.)	

DIET MENU.

Price Mk.............

Fowl will be reckoned extra.

1. Soup according to choice.
2. Meat or fish according to choice.
3. Vegetable or potatoes or salad according to choice.
4. Stewed fruit or sweets.

* The digestibility of the meat depends less on its colour than on its quality and preparation.

Fig. 1.—The above is a reproduction of the special chart used at Homburg, under the supervision of the Medical Society in co-operation with the different hotels and boarding-houses. At his first meal, the waiter asks the patient for his diet chart, which he has received from his doctor, and he orders his food from this.

easy and pleasant motor run of a Sunday. Nevertheless, Homburg is alive to the needs of a great modern spa, and only last month a new wing of the Kaiser Wilhelm Bad was opened, with a special installation for fango treatment. The park at Homburg is said to be the largest at any German spa (though Nauheim and Kissingen rather resented this statement) and certainly it is one of the most delightful parks in the world, with a dazzling Siamese gateway (presented by a grateful King of Siam) at one end of it. The treatment at Homburg is especially for gastro-intestinal affections, obesity and disorders of metabolism. The season is from the beginning of May to the end of September, and " all-in " terms for the complete cure of three weeks (including Kur-tax, doctor's fees, baths and other treatments, and board and lodging) range from 205 marks to 310 marks (about £13 : 15 : 0 to £20 : 13 : 6), according to the hotel. Homburg was the first place on the Continent where lawn tennis was played and also to have a golf course; nowadays there is both a nine-hole and an eighteen-hole course, as well as many tennis courts.

BAD NAUHEIM

Nauheim, in Hesse, has made itself a world centre for the treatment and study of heart disease, and even the flower-beds throughout the town (in June) were filled with foxgloves (digitalis). There is a well-equipped Medical Institute, founded since the war by the State, and in charge of Professor Meyer, who is professor of cardiology at the University of Giessen, a dozen miles away. But this Institute has been put in the shade by the opening of the Kerckhoff Institute in 1929. This, so I was told by Professor Koch, the director of experimental pathology, is a " million-dollar " institute (a term I had heard before in America), and looks it. It was given by an American widow in memory of her husband, who was a regular visitor to

Nauheim, and includes also a large fund for helping scientific research and education, by scholarships and otherwise, in heart and vascular diseases. This institute is equipped on the most lavish scale, and is under the direction of Professor Groedel, who is professor of cardiology at the University of Frankfurt. It seems a pity that the excellent and modern Medical Institute has been repeated and gilded as the Kerckhoff Institute, but at least this engenders a healthy rivalry and may in the end make for advances in cardiology.

Graduated exercises used to be an important feature of the treatment at Nauheim, but they have been given up and the graduated walks are used no longer. The baths are of various types : brine baths free from carbonic acid; natural warm baths with a small percentage of salt and a small percentage of carbon dioxide; the sprudel baths, natural warm salt baths with a high percentage of carbon dioxide; and the sprudel stream baths, with strong carbon dioxide salt water flowing in and out during the whole period of the bath. The baths can thus be graded to every degree of disease and to the varied needs of the patients. The

FIG. 2.—The Kerckhoff Institute, Nauheim.

conveying of the different kinds of waters from the natural springs to the eight bath-houses, with 368 bath cabinets, is a most elaborate underground engineering work, and up to 6,000 baths a day can be given. Nauheim also makes a specialty of the treatment of respiratory and catarrhal diseases, and there is a large "inhalatorium" of rooms equipped with a great variety of atomisers and similar apparatus. The baths cost 4 marks (about five shillings) each, and hotels from 9 to 18 marks a day.

BAD KISSINGEN

Kissingen, in Northern Bavaria, is a delightful town, with a quaint mediæval market place and a river running through its park and gardens, situated in a valley and surrounded by forests. The pump-room and promenade hall must be, I imagine, the largest and airiest in the world, while the great concert hall, the Regentenbau, is magnificent, and exceptionally fine concerts and operas are given in Kissingen during the season. There are over 400 baths in the different bath-houses, and all the modern methods of treatment are employed. The waters are natural saline waters with free carbon dioxide, and the cure at Kissingen is especially for diseases of the gastro-intestinal system, liver and gall-bladder, heart and blood-vessels. The cost of a cure at Kissingen is much the same as at the other spas I visited: 10 to 12 marks a day for room and board at the hotels or 15 marks (£1) a day at most of the sanatoria, including dietetic meals, medical attendance and special treatments. Kissingen is not only a well-equipped spa, but a very pleasant holiday centre, as it is within easy reach of the old university city of Würzburg, mediæval Rothenburg and Nürnberg, and Bayreuth, the temple of Wagner. I liked very much the cheerful Bavarian atmosphere of Kissingen—but all of these spas had a friendly air and the hotel servants completely lacked the itching palm often noticeable abroad.

The Development of the Cardio-Vascular-Renal Syndrome

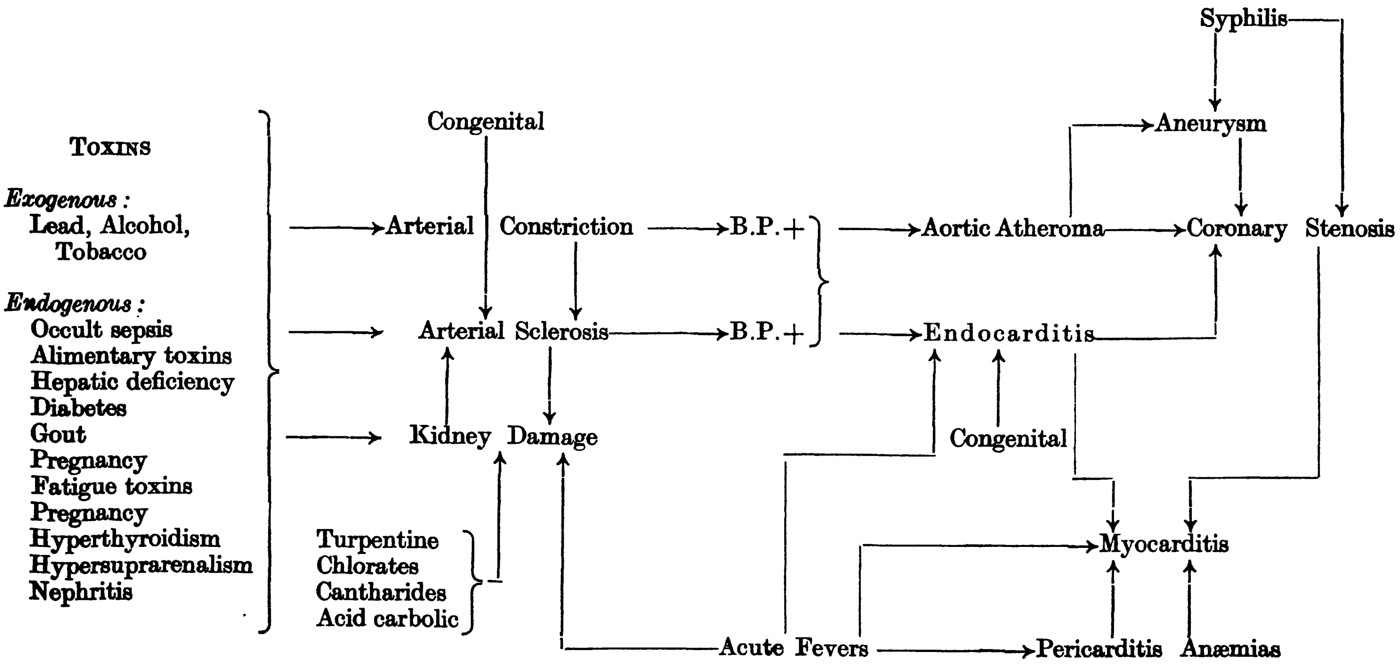
By R. E. HORSFALL, M.D.

MANKIND pays an exorbitant price for the doubtful blessings of civilization. The anxieties and turmoil of modern life are responsible for many morbid reactions in the human body, and not least among the affected tissues are the circulatory system and kidneys. We are frequently confronted with the symptom-complex of raised blood-pressure, arterial and myocardial degeneration, and renal inadequacy. It is a clinical picture easy of recognition, but it is often a difficult problem to define the causal factor and to interpret the manner in which the various tissues become involved.

The analysis of the etiology and chronology of the syndrome is an arduous task, because of the close inter-relationship between arteriosclerosis, hyperpiesis, and nephritis. In approaching the problem, we must ask ourselves : " Is the arteriosclerosis the cause or the sequela of the nephritis ? Is the myocardial damage secondary to the arteriosclerosis, or are they both due to a common causal factor ? " We are, in short, confronted with the question propounded in a ribald song, " Which came first, the chicken or the egg ? " In discussing this issue, many textbooks reveal an ambiguity and incoherence of expression which confuses still further an already intricate problem. The scheme on p. 293 is an attempt to clarify the position by summarizing the etiological factors, and correlating their reciprocal interactions as further explained below.

(A) *Relationship between arteriosclerosis, hyperpiesis and nephritis.*—Assuming the presence of a circulating toxin, either endogenous or exogenous, the course of

INTERACTION OF CAUSAL FACTORS IN CARDIO-VASCULAR-RENAL SYNDROME.



events may be along one of the following lines :—

(1) Arterial hypertrophy and, later, degeneration, may result from direct action of the toxin on the vessel walls, or from prolonged toxic vaso-constriction. This loss of elasticity in the arterial tree causes a rise in blood-pressure, and in a minority of cases (probably about 7 per cent.) secondary fibrotic changes occur in the kidneys, leading to benign renal sclerosis (arteriosclerotic kidney), with albuminuria, casts, and, perhaps, nitrogen retention in the later stages.

(2) Malignant renal sclerosis (chronic interstitial nephritis) may be the first effect of the toxæmia. The subsequent events may then be: (*a*) A compensatory rise of blood-pressure in order to maintain an efficient renal circulation through the fibrosed kidney, with the consequent development of arteriosclerosis; (*b*) The accumulation of toxic metabolites in the circulation, causing arteriosclerosis and resultant hypertension.

(B) *Relationship between the myocardium and the above triad.*—Hyperpiesis may cause (*a*) aortic atheroma, leading to stenosis of the openings of the coronary arteries, with deficient blood supply to the myocardium and consequent fibrosis; (*b*) chronic endocarditis of the aortic valves, with stenosis of the coronary orifices; (*c*) a compensatory hypertrophy of the myocardium, with eventual cardiac degeneration. Also the circulating toxin may directly damage the cardiac muscle, or indirectly by sclerosing the coronary arteries.

The diagram shows the position occupied by syphilis, which does not cause a rise of blood-pressure, but which may damage the myocardium by stenosis of the coronary orifices consequent upon mes-aortitis. The essential precursor to successful treatment is accurate diagnosis; hence the importance of an etiological survey such as that attempted in the above scheme, in connection with the cardio-vascular-renal syndrome.

Practical Notes

The Control of Drug Addiction

Paul Wolff, of Berlin, says that among the many bitter legacies of the World War and post-war times, not the least difficult to combat has been the growth and extension of drug addiction, and many medical practitioners and research workers have succumbed to its seductive influence in spite of all their knowledge. According to recent statistics (Pohlisch : *Monatsschr. f. Psychiat,* 1931, i, 79), the number of medical practitioners in Germany who personally consume a tenth of a gram or more of morphine daily is about 500; that is to say, roughly 1 per cent. of the profession. In British India, opium eating is endemic, although, as far as we know, it is decreasing rapidly, at least as far as the production of the drug goes. A stringent control is being exercised, which, however, is largely vitiated by the fact that the semi-independent native states have preserved their independence in this respect. According to a resolution of the Government, the export of opium to the Far East, apart from supplies destined for medical or scientific purposes, will have ceased within ten years; that is to say, at the end of 1935. So long, however, as opium is manufactured in quantities far in excess of those required for these serious purposes, the prevention of illegal traffic is impossible. Curiously enough, opium smoking is not customary in India. On the other hand, a certain special form of addiction is practised which apparently is peculiar to India. It consists of the use of the intact capsules of papaver somniferum—the so-called "post," the fresh poppy heads being thoroughly macerated with water and the resulting fluid is swallowed. This practice is confined to the Punjab, where there is a total of only 6,500 addicts. Egypt has become the chief battlefield in the fight against the trade in illegal drugs, heroin occupying the most prominent position. Russell Pasha, the chief of the Cairo police, recently stated that among a population of 14 millions, there are, at a moderate estimate, some half a million addicts (Egyptian Government, Central Narcotics Intelligence Bureau, *Annual Reports,* 1929, 1930, 1931). In the central prison there is at the present time a constant population of some 7,000 addicts and dealers sentenced for participation in drug traffic. In all necessary cases these prisoners receive medical treatment in the form of withdrawal cures. It is interesting to note that, while the number of addicts in Egypt has fallen considerably, the number of dealers has risen. As to the position in Europe, according to our present knowledge, the general impression is that addiction is in all respects on the decline. Occasional cases of smuggling on a large scale, which provide sensational reports for the daily press, need not deter us from arriving at this conclusion. Great Britain, for instance, has exceptionally few alkaloid addicts. Drug addiction has for her ceased to be an acute problem, and conditions are probably much the same in Norway, Sweden and Denmark. As to the position in France, there is little information. At the present time, scientific investigations in this field are being carried out chiefly in the German-speaking countries. The new Austrian legislation is unfortunately all too lenient, with the result that Vienna has become a centre of smuggling, and the Egyptian Government has recently protested against this state of affairs. Thus, once again, the close interdependence of the various countries is emphasized and the universal nature of the problem of drug addiction demonstrated. In Germany the number of addicts has unquestionably greatly declined, as is shown by the decrease in the number of morphine and cocaine addicts arrested in public resorts. According to exact calculations made in 1928, the number of addicts, so far as the needs of these individuals are covered by medical prescriptions, varies from 4,000 to 6,000 in a total population of about 64 millions. Somewhat more than a year ago a decisive step forward was made, and the German Government has introduced a system of stringent restrictions. As regards the problem of cocaine addiction, this resolves itself into the problem of its complete eradication. In Germany, for over a year the handing out of cocaine in substance by pharmacists has been entirely forbidden. In this respect the law is merely giving practical application to the opinion expressed in the report of the German Medical Congress in 1928, that it is absolutely unjustifiable for a medical practitioner to supply cocaine to a cocaine addict; there is no question of endangering the addict's life associated with the complete refusal to prescribe the drug under any circumstances whatever. Sudden withdrawal is, on the contrary, the treatment of choice. The largest amount with which in Germany any practitioner may be supplied for daily use in his practice is 1 gram, and this may be issued in at most a 10 per cent. solution. When prescribing it he must make out an accurate prescription and make a corresponding entry in the so-called cocaine book. He is allowed to use this solution for operations (including diagnosis) only on the eye, larynx, nose and ear, pharynx and maxilla. Further, it may be applied only to the mucous membrane, and any form of injection is forbidden.—(*Journal of the American Medical Association*, June 18, 1932, xcviii, 2175.)

The Examination and Treatment of Cardiac Affections

Karl Barth, of Bad Nauheim, discusses some practical points in the examination and treatment of patients suffering from cardiac affections. In the first place, one must confirm what degree of disturbance of equilibrium in the circulatory system is present. Disturbance of equilibrium in the circulatory system may be: (*a*) confined to that system alone, that is, changes in the heart, in the aorta, in the arteries and in the veins; (*b*) connected with other organs, that is thyreotoxicosis, scoliosis, granular kidney, obesity, tuberculosis or diabetes; (*c*) connected with the mind, that is, worry, jealousy, love, melancholy, cyclothymia; (*d*) connected with external circumstances, with the demands and duties of life, such as continual excitement, too much work and too little rest. When this point has been settled, the next question that arises is: (*a*) whether it is possible to restore the equilibrium in any way, that is, whether the patient is still young enough to change the external circumstances of his life, or at least that the preliminary steps towards such change may be made; (*b*) if this is not possible, then one must follow Nature's method in attempting to relieve the damaged organ by improving the functions of the other organs. Methods towards this end include diminution of the circulating fluid by limitation of the fluid intake, venesection, promotion of perspiration, and stimulation of the circulation and metabolism in the periphery by massage and CO_2 baths; respiration may be improved by respiratory exercises, while the digestive processes should be lightened by suitable diet, pepsin, hydrochloric acid and pancreas preparations. All unnecessary demands on the circulatory and respiratory system should be avoided by prescribing rest, moderation, and endeavouring to secure quietude of mind. It is not until such measures as these have been exhausted that treatment by drugs should be considered, although, of course, one or more of these causal factors may be acting at one and the same time. To secure adequate compensation of the circulatory system is of the greatest importance in prolonging life, and it is the failure to do so that so often results in sudden collapse, in which the prognosis is grave.—(*Münchener Medizinische Wochenschrift*, July 8, 1932, lxxix, 1109.)

The Treatment of Tennis Elbow

L. Carp points out that an inflammatory involvement of the conjoined tendon at the epicondyle or of a structure in close proximity to it may produce the clinical syndrome known as tennis elbow; one of these structures is the radio-humeral bursa. It is recommended that in all cases of tennis elbow an X-ray examination be made in order to try to visualize an osteitis of the epicondyle or a pathological and distended radio-humeral bursa. The visualization of the latter condition depends on the character of the fluid contained or of the deposit in the wall; the presence of calcium salts produces a shadow. The author gives details of 8 cases of radio-humeral bursitis, in which good results were obtained with different types of treatment. Direct trauma produced the lesion in two cases, indirect trauma in three, combined direct and indirect trauma in two, and a questionable trauma in one. Swelling over the bursa was present in five cases, and there were positive X-ray findings in five. The operative finding in one case was a calcified radio-humeral bursa. In three other cases, the spontaneous absorption of calcium deposits was noted. In the remaining four cases, manipulative rupture of the bursa was the method of treatment used. The author insists that radio-humeral bursitis, especially in the presence of swelling, is frequently the cause of tennis elbow. Prompt relief may be expected from rupture of the bursa by firm digital pressure applied over the epicondyle and radio-humeral joint. When this procedure is very painful, a general anæsthetic is advisable. Operative treatment is not recommended unless conservative treatment fails to relieve prolonged or recurrent pain and disability.—(*Archives of Surgery*, June, 1932, xxiv, 905.)

The Treatment of Fissure in Ano

J. Dunbar discusses the treatment of fissure in ano, and speaks with enthusiasm of the use in the chronic form of a slow-acting local anæsthetic called A.B.A. This consists of anæsthesin and benzyl alcohol in oil and is made by Messrs. Allen & Hanburys. The author precedes the injection of A.B.A. with some novocain hypodermically, as this allows the fissure to be easily seen, and alleviates the pain which A.B.A. causes for a few hours. For the injection of A.B.A. a wide-bored needle (No. 1) is inserted into the subcutaneous tissue one inch behind or in front of the lower end of the fissure; the area injected is fan-shaped and extends at least half-an-inch on either side of the fissure, and also below its base. Some of the injection is put into the sphincters, and the deeper parts of the injection are controlled by a finger in the anus. This allays spasm of the sphincter and allows the ulcer to heal.—(*Glasgow Medical Journal*, July, 1932, cxviii, 41.)

The Surgical Treatment of Osteitis Fibrosa

W. Hoffmeister, who is Chief of the Surgical Clinic in Munich, emphasizes the importance of exercising care in the method of treatment to be selected in osteitis fibrosa, because commencing sarcomata may present very similar appearances to osteitis fibrosa in the histological changes which take place in the neighbourhood. The arrangement and appearance of the giant cells cannot be used as a basis for differential diagnosis of osteitis fibrosa and sarcoma. Cystic osteitis fibrosa heals most rapidly and with greater certainty when the total diseased tissue is removed; at the same time, basic resection of all pathological tissue avoids any possibility of sarcomatous degeneration. Neither the radiogram nor the histological findings are conclusive for diagnosis, and as long as there is no clear line of demarcation between benign and malignant changes of bone, the method of treatment which a surgeon may adopt should be clear and definite. Thus for the treatment of osteitis fibrosa or of a commencing disease of the bone which in appearance and in findings presents a similar picture to osteitis fibrosa the following is recommended: Small cysts are chiselled out of sound bone; large cysts are resected and the defect is bridged by bone transplantation. If the case is one of osteitis fibrosa without tendency to sarcoma, then the clearing out of the subperiosteal tissue prevents recurrences. Resection of the bone does not produce deformity of the limb, since the bone may be completely regenerated from the periosteal covering. Should, however, a sarcoma be dormant in the central part of the bone beneath the osteitis fibrosa, then early resection offers the best chances of satisfactory outcome. Resection may also be employed when the tumour has broken through the bone but is still circumscribed with regard to the soft parts. If on operation it is found that the tumour has broken through into the soft parts, then the diagnosis of sarcoma is confirmed. In such cases alone is it necessary to carry out amputation or exarticulation, which would produce crippling of the limb.—(*Deutsche Zeitschrift für Chirurgie*, May 22, 1932, ccxxxvi, 191.)

Reviews of Books

A Short Practice of Surgery. By HAMILTON BAILEY, F.R.C.S., and R. J. McNEIL LOVE, M.S., F.R.C.S. Two volumes. London: H. K. Lewis, 1932. Vol. I. Pp. 530. Figs. 269. Price 20s.

DESCRIBED in a preface as a survey of general surgery, this book is presumably intended to contain such surgical information as is exacted of the qualifying student, and to convey it in a manner suitable for revision reading. In the present volume we think the authors have succeeded, though the standard of information varies in the different chapters. The virtues of the book are its readableness, its print, its illustrations; its one vice the certainty attributed to controversial and even inaccurate matter. A habit of pedagogy is thus betrayed to which, though it is upheld by many of the more dramatic teachers, we cannot lend our approval. For example, the chapters on the pharynx contain some surprising pronouncements: pressure diverticulum is said to originate in the region of a branchial cleft from the Lannier Hackerman area, which is shown in an illustration as laterally placed immediately behind the trachea and thus in the œsophagus. We have not seen a cervical pharyngeal pouch that was not median and posterior in origin, thus corresponding to the usual description of position of the Lannier triangle. In the surgical treatment of the same condition, a two-stage operation is said to be necessary to prevent mediastinitis, a fallacy long ago exploded by Trotter. Considerable space is properly devoted to fractures, and the clinical accounts of the various injuries are excellent, though we cannot agree that there is a growing tendency towards operative treatment of fractures of the femoral shaft. Nor can we subscribe to the recommendations as to the treatment of Colles's and Pott's fractures, which we regard as reactionary. The sections on the breast, the urinary and genital tracts are very good and deserve the space allotted to them. The authors have not resisted the temptation to reproduce in this short text-book illustrations of their rare cases, sometimes to the exclusion of commoner forms of disease and injury. This weakness must be pardoned, however, as the drawings, photographs and radiograms scattered profusely throughout the text are among the best we have ever seen in a surgical text-book, both in execution and reproduction, on which we offer our congratulations to authors and publisher.

Mothercraft, Antenatal and Postnatal. By REGINALD C. JEWESBURY, M.A., D.M., F.R.C.P. London: J. & A. Churchill, 1932. Pp. ix and 178. Illustrations 21, 13 in colour. Price 10s. 6d.

PART I of this book is by John S. Fairbairn and deals with the relation of mothercraft to other aspects of maternity work; much useful information is given on antenatal care, intranatal and puerperal management. In Part II Professor Mellanby describes shortly the physiology of lactation and this article is perhaps the best in the book. In Part III Dr. Jewesbury writes on the feeding and management of infants, weaning, some of the difficulties met with in breast feeding and their management, artificial feeding, digestive upsets, marasmus, acidosis, thrush, eczema, etc. The points are put clearly, the article on breast feeding being particularly good and illustrated with some excellent charts. Truby King's method of infant feeding, including the use of New Zealand cream, is described with much pains and the author seems well satisfied with the results, but the simple method of feeding the baby with the precise quantity of good whole milk, water and sugar per lb. of baby weight and the daily administration of the necessary vitamins would certainly seem to give quite equally good results. However, this is a matter of individual experience and opinion. More might have been mentioned on the use of acid milk in the numerous varieties of cases to which it is eminently suitable. This book is well printed and should prove specially valuable to those who desire information on the particular method of infant-feeding advocated.

History of Scottish Medicine. By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P.E. Two vols. London: Published for The Wellcome Historical Medical Museum by Baillière, Tindall & Cox. Pp. 856. Illustrations 405. Price 50s.

DR. COMRIE has greatly expanded an earlier work into this magnificently produced *opus magnum* on Scottish medicine. He begins with records and illustrations of trephining and other operations in Scotland during the Stone and Bronze Ages, and continues up to such recent times that many of the subjects dealt with at the end of the second volume are still alive. Perhaps the most interesting chapters are those that deal with Gaelic medical manuscripts, hereditary highland physicians, folk medicines and cures, and the ancient lore connected with charms, spells and amulets. A special chapter is devoted to early public health enactments—such as the law of 1450 which forbade the inhabitants of Edinburgh to allow swine to wander freely in the streets. The origins and histories of the Colleges of Physicians and Surgeons of Scotland and the universities and medical schools are dealt with fully by the author, and many foibles of early professors are illustrated by anecdotes and contemporary caricatures. There is a long account of the family of Gregory, which provided no fewer than 16 professors in Aberdeen, Edinburgh and other universities, and the famous dynasty of the Monros forms another interesting section of the history. Dr. Comrie reaches his apogee with the great days of the Edinburgh medical school in the 19th century, and after this his accounts of celebrities nearer our own times seem rather trivial. The author must be congratulated on the production of a monumental work that no one else could have achieved, and Sir Henry Wellcome should be thanked by all interested in Scottish medicine for the lavish manner in which he has presented Dr. Comrie's work.

The British Pharmacopœia, 1932. London: Constable and Co. Pp. l. and 713. Price 21s.

THE first pharmacopœia published in this country was brought out by the Royal College of Physicians of London in 1618 and contained many weird and disgusting preparations. The Medical Act of 1858 enacted that the General Medical Council shall cause to be published under their direction a book containing a list of medicines and compounds, and the manner of preparing them, to be called " the British Pharmacopœia." This was first published in 1864 and the fifth edition appeared in 1914. In the preparation of the later editions Sir Donald MacAlister, President of the Council (1904–31) and Chairman of its Pharmacopœia Committee, which was responsible for the work, took an active part. It may perhaps be mentioned with pardonable pride that he was one of the editors of THE PRACTITIONER, being associated with the late Sir Lauder Brunton, from 1882 to 1894. The sixth edition of the British Pharmacopœia will be published in October next, but an advanced copy which we welcome has been courteously made available. Though the General Medical Council has entrusted its Pharmacopœia Committee with the general supervision of the work, the Council, acting on advice, appointed a Selection Committee to choose a Pharmacopœia Commission to prepare this edition. The chairman of this body was Dr. A. P. Beddard, and the secretary, Mr. C. H. Hampshire, and the present volume bears eloquent evidence to their labours; they set up six important sub-committees, the research work undertaken by them for the Commission's revision having been published in various scientific periodicals. The revision has been of a very thorough character; a number of fresh articles and preparations have been added and a much larger number have been removed, and these important changes have been made after consultation with other bodies and with all the Governments and Administrations of the Empire. The long interval since the fifth edition in 1914 has naturally necessitated great alterations, which have been carried out with critical care and much consideration. In the future the British Pharmacopœia will be revised every ten years.

Mental Deficiency Practice. By F. C. SHRUBSALL, M.A., M.D., F.R.C.P., D.P.H., and A. C. WILLIAMS, M.R.C.S., L.R.C.P., D.P.H. London: University of London Press Ltd., 1932. Pp. vi and 352. Price 12s. 6d.

THIS book supplies a long-felt want, for no one book containing the essentials of examination, diagnosis, prognosis and administration of mental deficiency has hitherto been available. The authors specifically state that clinical features and administration have been given the more prominent place, and in this they are wise, for the necessary measures by which mental defectives can be dealt with and the various legal procedures involved are not a matter of common knowledge. The appendix, which gives specimen forms which may be required for administration completed as they might be in practice, should be of special value. The types of mental deficiency, so unfortunately common, consequent upon an attack of epidemic encephalitis, present many a medical man with a difficult problem. The differential diagnosis of this condition is very well considered. In dealing with the clinical types of mental deficiency no mention is made of the late infantile and juvenile forms of amaurotic family idiocy which occur in non-Jews and in which death may not occur till adolescence or even early adult life. In the routine examination of the nervous system ophthalmoscopic inspection of the fundus is surely at least of equal importance as an examination of the pupillary reflexes and the knee-jerks.

The Use of Lipiodol in Diagnosis and Treatment. By the late Professor J. A. SICARD, Physician at the Necker Hospital, Paris, and J. FORESTIER. Oxford University Press. London: Humphrey Milford, 1932. Pp. ix and 235. Illustrations 50. Price 16s.

THIS clinical and radiological monograph on a means of diagnosis which was first brought to the notice of the profession by these authors in 1921, is both authoritative and comprehensive, as is borne out by a bibliography of 39 pages. As the senior author died early in 1929–30, the brunt of the work in writing this volume must have devolved upon his pupil, Dr. J. Forestier. The diagnostic use of lipiodol is chiefly familiar in connection with diseases of the nervous and respiratory systems, and the authors consider that in broncho-pulmonary work it will undoubtedly supplant the bismuth insufflations recommended by Chevalier Jackson; but it can also be employed in diseases of other parts of the body, such as the male and female generative organs, the urinary tract, the blood-vessels, nasal sinuses, and in estimating the secretory activity of the stomach. These uses are described in successive chapters of this successfully illustrated work, the radiograms in which are of a high order of merit. The contra-indications to the employment of lipiodol are few, namely, extreme sensitiveness to iodine, active tuberculosis with fever, and a very poor condition of the patient. When in a state of perfect preservation lipiodol is well tolerated by the tissues; the only ones which react are highly inflamed serous membranes, which do so because they set free some iodine. But if lipiodol is kept and turns of a brownish tint from the liberation of iodine, a severe reaction may follow; the authors feel certain that all accidents ascribed to its use are due to the employment of a stale compound. The therapeutic value of lipiodol is not so generally known, but in nine cases out of ten an epidural injection will rapidly cure lumbago or rheumatoid sciatica. Injections into the sacro-iliac joint, or even in its vicinity, give brilliant results in so-called rheumatic sciatica. Benefit also follows the injection of lipiodol into bronchectatic cavities, and after combined epidural and subarachnoid injections in enuresis.

Notes for Diabetics. By one of them. Sydney: Angus and Robertson, 1932. Pp. xiii and 98. Figs. 4. Price 5s.

As Professor Harvey Sutton points out in an appreciative foreword, this is a remarkable account of an intelligent layman's experience and gives a vivid description of the disease. Having tried a number of quack remedies he warns his readers against such *soi-disant* infallible remedies, and has been through an attack of coma receiving 400 units of insulin in the space of two hours. This is an attractively and brightly written book with quotations from, and acknowledgments to, Dr. E. P. Joslin of Boston, Professor H. Maclean, and Dr. Robert Hutchison.

Notes and Preparations

DROITWICH

Of all the English spas, Droitwich seems to us the one which has the greatest possibilities, for its waters are unique in Europe, holding in solution about 30 per cent. of natural salts, about ten times the density of sea water, and more salt than the Dead Sea. Still, if it were to realize its possibilities and rival the great spas of the Continent, Droitwich would lose much of its charm, for at present it is still a pretty little country town, picturesquely situated in the leafy county of Worcester, although it can treat 500 patients a day and expects in time to be able to treat 1,000 a day. The chief constituent of the waters is sodium chloride (296,140 milligrams per litre, as expressed by the old notation), or, expressing the mineral constituents as ions, the chief constituents are sodium (117,313 milligrams per litre, international standard), and calcium (1,328 milligrams per litre). There are two bathing establishments, the Royal Baths, opened in 1836, and the St. Andrew's Baths, erected some fifty years later, but both buildings have been considerably remodelled as well as extended in recent years. The Royal Brine Baths Clinic was opened in July, 1931, primarily for the treatment of patients whose means necessitate economy and who would otherwise be unable to take the baths at Droitwich, and a modern building, formerly the Royal Hotel, has been converted for this purpose, with up-to-date equipment; it is in close proximity to the Royal Baths. The conditions treated at Droitwich are especially all forms of rheumatism, but also certain heart disorders, nervous exhaustion, anæmia, and injuries of tendons, muscles and joints; the treatment is also a general tonic in convalescence after most illnesses.

GLUCATOR

The glucator is a simple apparatus, made by Messrs. Napp (3 and 4, Clement's Inn, Kingsway, London, W.C.2), for the rapid and accurate quantitative estimation of sugar in the urine, two or three minutes only being required. The apparatus is neat and compact, and costs half-a-guinea; it is apparently a modification of Fehling's test, but by marking of the test tubes and pipette and with the aid of a table that is given, it is easy to calculate the amount of sugar in the urine passed in 24 hours in grams or in ounces.

G. L. AMPOULES

The new G.L. ampoules are of a pattern that has been used for a considerable time on the Continent, their distinctive feature being that they open easily with a clean break and have no "dead" space in which part of the solution may accumulate and become unavailable. A ridge on the short neck of the ampoule is its special breaking point, and after drawing the opener briskly across both sides of the bridge, the head can be snapped off cleanly, without splintering. These ampoules are manufactured in England for the Glaxo Laboratories (56, Osnaburgh Street, London, N.W.1) from glass which conforms to the requirements of the new British Pharmacopœia. The drugs contained in them are accurately standardized by chemical or physiological means or both, and the packed products are sterile and ready for injection. Most drugs used hypodermically are available in solution in the new G.L. ampoules, including morphine, hyoscine, strychnine, digitalin, ephedrine, adrenaline and procaine.

IODIZED MOOGROL

Iodized moogrol is a mixture of esters of the acids of the chaulmoogric series combined with 0·5 per cent. of iodine, made by Messrs. Burroughs Wellcome & Co. (Snow Hill Buildings, London, E.C.1). The addition of the iodine markedly reduces the irritating properties of the ethyl esters. Preliminary clinical experience confirms that iodized moogrol is less irritating than plain moogrol. At the Leonard Wood Memorial Conference on Leprosy, held at Manila, in January, 1931, the use of iodized esters, particularly by the intradermal method, was strongly recommended. The intradermal or intracutaneous method has been employed by the Philippine workers for some years and the advantages claimed are that it produces a more rapid resolution of the superficial lesions and that it is relatively free from general and local reactions.

STIPOLAC

The radiological examination of the gall-bladder by the aid of radio-opaque substances has now become a commonplace of surgical diagnosis, though improvements towards improving the efficiency and decreasing the toxicity of the substances used are still to be looked for. Messrs. Burroughs Wellcome have just brought out a new preparation, " Stipolac " brand of sodium tetra-iodo-phenolphthalein and a special acid mixture, in two tubes, the contents of which are mixed together immediately before administration. This seems more effective than previous preparations.

BOLLINGER CHAMPAGNE

The well-known Bollinger champagne has long had a reputation with gourmets; but recently Messrs. Bollinger have been putting up their " Special Cuvée " in quarter bottles, for the use of invalids. " Special Cuvée " is a non-vintage wine, and therefore less expensive than a favourite vintage year, but the demand for it has been so great that vintage wines are used for it. It is very dry, and can be especially recommended for use in hospitals and nursing-homes. Nowadays Bollinger champagne can be obtained through any wine merchant.

THE PRACTITIC

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Maternal Mortality and Morbidity

The Final Report of the Ministry of Health Committee

BY SIR WALTER FLETCHER, K.B.E., C.B., M.D., Sc.D., F.R.C.P., F.R.S.

Secretary of the Medical Research Council.

FEW words are needed to stress the gravity of the problems of maternal mortality to the people of this country and to the practitioners who serve them. Over fifty women die in childbed every week in England and Wales alone, as the result of fulfilling the physiological function of motherhood, and of these no less than twenty a week die because of septic infection. A great but unmeasured burden of morbidity and suffering, as direct after-results of childbirth, is laid every year upon many thousands of other mothers.

The Departmental Committee have endeavoured by close inquiry to unravel the complex of factors, social, economic, administrative and clinical, that contribute in their several degrees to this deplorable loss of life and health. They have stated concisely the findings they have reached and the practical measures they recommend. The Report is now before the profession and the public and will no doubt receive early and earnest consideration.

Very many of the factors concerned in our national rate of maternal mortality are familiar and have long been under study. Problems such as those of the training and supply of doctors and of midwives, the extension of ante-natal care, the improvement of hospital accommodation, and many others, have long ago been attacked, and progressive steps have already brought us nearer their solution. The Report will, it is hoped, bring still further progress. Many must feel, however, that in these matters there has already been notable advance in the past generation, and yet this has been unrewarded by any significant corresponding fall in the maternity death rate. Have we any ground for hope that the work of this latest Committee is going to be any more effective? Will it lead to more than a beneficent encouragement of movements already in train and well recognized as upon the right lines of progress? Will it lay a new and decisive mark upon the national death-roll figures? Are there, in short, any hopes of a new kind to which the Committee have been able to point? Has recent research work contributed any effective new powers? Has it given positive guidance of a practical kind to the management of labour? I venture to believe that all these questions can be answered in the affirmative.

One of the most pregnant of the conclusions of the Committee is thus expressed: "Rickets, now a preventable disease, has a most important bearing on maternal mortality, and its prevention should substantially reduce the maternal death-rate." The Committee have perhaps erred here into undue moderation of statement. When our mortality figures are compared with those for the nearest of our kin in Denmark and Sweden, to the apparent disadvantage of our doctors and midwives, it is too often forgotten how heavy is the handicap under which our obstetricians have to play to gain their score. The mothers of to-day and all their predecessors for generations in our dense and industrialized community have belonged to a people riddled by rickets, " the English disease." Our medical profession with steadily increasing skill have had to meet all the difficulties and dangers offered by the narrowed pelvis that has been characteristic of a very high proportion of our women. Among the most useful and enlightening parts of the Committee's Report is surely that in which an account is given of the careful comparative studies of the maternity work in the Netherlands, Denmark and Sweden made by Dr. Oxley and Professor Phillips, who, with Dr. James Young, were good enough to visit those countries for the Committee. In all these countries, the maternal mortality is lower than in ours. For the five years, 1925-1929, in the Netherlands the average death-rate has been 2·98 per thousand to our 4·2. But in those countries rickets is rare and pelvic narrowness very uncommon. Their women have access to diets allowing healthy skeletal development and so are protected from the risks (and pain) that are so commonly faced by women in the industrial areas of England and Wales. The detailed evidence on which these statements are based is given in the Report. Anæsthesia is much less used in the normal labours that are the general rule : " Even the higher classes, who are in a position to command it, rarely ask for it." Instrumental aids are more rarely used and the opportunities for sepsis are much diminished.

Rickets declined greatly in England after the war as wages and the standard of diet rose, and as the results of work done for the Medical Research Council from 1914 onwards by Professor E. Mellanby, who discovered that rickets is a deficiency disease preventable by supply of the appropriate vitamin. As the post-war young come into the ages of motherhood we may expect to see a shift towards normality of the pelvic measurements of British women, and a lowered maternal mortality. We must be careful not to attribute this to the labours of the recent Committee!

But in the last year or two of economic depression there have been some signs and many dangers of a regression in this recent national escape from rickets and the protean evils that spring from it. Recent research work happily has brought means of making adequate supplies of vitamin D readily available for all nursing mothers and growing children throughout the population. Administrative action is lagging too far behind the advances in knowledge that have brought these increased powers. Since the effect on the maternal mortality rate can be expected only some eighteen years or more in the future, when the babe of to-day is ready for motherhood, there is an urgent national call for rapid action now.

The same researches have brought potentially an immeasurable boon to our fellow-subjects in India, where the tale of rickets, osteomalacia, and the resulting pains and dangers of child-birth, is one hardly to be surpassed for the intensity and volume of its horrors. It is a tale that will never be ended until we give the realities of life there a higher consideration in the theory and practice of Indian Government than issues fundamentally subordinate to them.

It is to recent researches in another field of work that the Report owes in perhaps the greatest degree the new hopes it can hold out to the nation of a reduced maternal mortality. Sepsis accounts for 37 per cent. of all the deaths, and 18 per cent. of all the deaths are due to sepsis after quite normal labour. I think that many will agree that both the most interesting and the most hopeful chapter of the Report is that dealing with puerperal sepsis and the research work organized to attack it. A great debt of obligation is owed by the community to Queen Charlotte's Hospital for their enlightened action in forming and equipping a research unit in which special puerperal wards are in organic relation to the research laboratories. The Medical Research Council have been enabled to co-operate by supplying the services of the Director, Dr. Colebrook, and other help. More recently the Rockefeller Foundation have made a generous financial provision towards the support of the scheme. The results of much of the work done here that already finds its application in practical use, are given in the Report. Similar work of great value has been done at University College Hospital, in laboratories of the Ministry of Health and of the London County Council, at Aberdeen, at Sheffield, and at other centres. Better precision has been given to the guidance offered in the performance of the " antiseptic toilet " of the patient and of her attendants. Above all, certainty has fully replaced suspicion that the septic organisms causing puerperal deaths are often derived from the mouths or noses of those about the parturient mother. It is hard to believe that any who read the evidence provided in the Report will take the responsibility of ignoring the strong recommendation of the Committee that the same precautions of using gloves and face-masks should be adopted during every labour as are thought indispensable now at every surgical operation. In the absence of face-masks, other precautions such as securing the absence of infected " carriers," the avoidance of talk in the labour wards and of bending unnecessarily over the patient become more imperative.

Very many problems of the streptococcus remain unsolved, and their intricate variety is well shown in the programme of researches in progress or contemplated which is given in the Report. In particular should be noticed the studies being made, by Dr. Colebrook especially, of the anærobic forms of streptococci as distinguished from the ærobic *Streptococcus pyogenes*, which have now been definitely associated in many cases with puerperal fever. These anærobes appear to be chiefly endogenous in origin—derived from the mother herself They have hitherto escaped common notice because they are missed of course in routine bacteriological examinations unless special anærobic methods are used.

It is the helplessness of the clinician in the presence of established streptococcic invasion of the body that calls for the utmost rigour of preventive measures. The little we know yet of the intimate biochemistry of the hæmolytic streptococci is only enough to illustrate more clearly their insidious powers of accommodating themselves, presumably by selective adaptation of their rapidly multiplying generations, to the particular host environment they enter, and in such manner as to become most deadly to their host. They can kill under the names of a dozen different diseases. Their powers against us are a humiliation to mankind. No goal more desirable was ever set before the biochemist than that of gaining for us the devices by which we might securely defeat the streptococcus parasite, by frontal or flank attack, in abortive or curative treatment of its infective invasions.

It is not defeatism but the best kind of optimism to recognize the limitations of our present knowledge. To be clearly aware of ignorance is the first condition of fresh progress and the best stimulus to the application of scientific method. By that path we have the soundest reasons in experience to expect success with confidence, and by no other can we hope to attain it. I have only space to touch here upon two other parts of the subject in which knowledge is much needed but still lingers. Beyond expectant treatment and palliation we have few effective weapons against the toxæmias of pregnancy, as the Report before us frankly admits. Devoted work by numerous clinicians and biochemists has been given to this group of problems, with results on the whole incommensurate in practical result with the skill and labour that have been engaged. Advance in knowledge of metabolic relations may come in some quite unexpected direction to give a new clue and new hopes to our studies of the pregnancy toxæmias.

Lastly, there is a clinical problem of the first importance and interest, to which physiology has on the whole been able so far to make little effective contribution. I refer to the disturbing effects upon parturition that may be produced by various grades of emotion, from anxiety to fear, in the mind of the mother. Slight emotional states may yield unexpected and apparently disproportionate results in direct stimulation of the sympathetic system. Fear leads, we know, to the liberation of adrenaline into the circulation and by that means again indirectly to sympathetic stimulation. To the anæsthetist this was long ago known to have important significance. A dose of adrenaline, within the limits attainable as the physiological result of " fear," if made contemporary in the cat with light chloroform anæsthesia, may kill at once by inducing ventricular fibrillation that probably never results from the chloroform alone.

What are the results of fear upon the physiological process of parturition? Can it inhibit or otherwise disturb the uterine contraction? The physiologist has not failed to make strenuous and long-continued efforts to give clear guidance here. But in the smaller mammals available for direct experiment results of the most confusing and contradictory kind are obtained. The effects of sympathetic stimulation, whether motor or inhibitor, which are found in one species flatly oppose those reported in another. Complete reversal of results may be obtained as the uterus passes from one phase of parturition to another. It is plain that to gain accurate knowledge for the human species means must be found of direct study of the human uterus in its different phases. We are unusually and perhaps solely dependent here upon clinical observations as such. Clinical study has already contributed much. Illustration of what it contributes already is given out of his abundant experience by

Dr. Fairbairn, as it happens, in the next following article. He speaks of the importance of " removing fears and anxieties " from the mind of the mother in ante-natal preparation. He urges that the mother should be encouraged to accept parturition as a normal function, to be approached with confidence and pride rather than with fear. I hope I do not misrepresent him if I say that he implies what it is surely almost irresistible to believe, that a mother is more likely to be in a placid frame of mind if she be attended before and during *normal* labour by a competent midwife rather than by a male doctor. The experience quoted already from the Netherlands and Scandinavia points strongly in the same direction, though it must be held in mind that the social status and technical training of the midwives there are much higher than are those in this country. What is the ideal at which we should aim? Ought normal midwifery to be increasingly in the hands of women? If so, we should aim at securing as soon as possible such conditions as will allow it to be recognized as one of the most honourable ambitions for a well-educated woman to serve her own sex by entering the responsible calling of midwifery. Does the profession approve of an increasing limitation of qualified practitioners to the management only of difficult and abnormal labours? These are questions that clearly present themselves for study and answer. I do not presume to offer any answer here, but the physiological considerations I have mentioned have obvious interest in relation to them.

Principles in Ante-natal Care in General Practice

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ANTE-NATAL supervision is inseparably bound up with the rest of midwifery practice—hence the natural criticism of the public ante-natal clinics that they "pigeon-hole" a section of obstetrics which is really an integral part of the whole and are frequently placed under the charge of practitioners who have no responsibility for their patients during the natal and post-natal periods. Thus those in charge under such conditions suffer from the grave disability of being unable to learn from the most compelling of instructors, their own failures. The justification usually given for the breaking of this universally accepted principle is that the establishment of such clinics was forced on the public health authorities by the failure of general practitioners and midwives to do the work adequately. But the family practitioner is in a far better position to undertake the ante-natal care of his own patients whom he will attend through delivery and the puerperium. Now that he is making the effort—perhaps a little late in the day—he is not doing it as well as he might because he has concentrated too much on the purely medical aspects of ante-natal care and has given insufficient attention to the educational and social services that form so important a feature of hospital and public clinics. The disregard of these less obvious aspects, especially that portion comprised in the term " mothercraft," arises partly from failure to realize that ante-natal care calls for the services of both practitioner and midwife, and partly to difficulties in arranging the necessary team-work between the two.

In order to show the need for co-operation between doctor and midwife, the simplest plan will be to review the services comprised in ante-natal supervision and indicate how they are apportioned between these two co-workers. The more strictly medical services consist of: (1) The supervision of the pregnant woman throughout pregnancy with a view to maintain at its optimum health of body and mind and to discover early and remedy any disturbances that may arise. (2) Care of the pregnancy itself so as to lessen the risk of miscarriage, premature labour or fœtal death. (3) The securing of normal labour and lying-in by eliminating all foreseeable complicating factors, such as malpositions, malpresentations and misfits and making provision for special treatment in such abnormalities as ante-partum hæmorrhage. (4) Attention to the breasts to lessen the chances of failure to nurse.

The other services, not so purely medical but none the less important, are hygienic, social and educational in character and difficult to classify. They may be grouped into measures tending to promote the health of mother and fœtus, to make the mother confident in her own capacity to bear and rear her family, bring out her maternal instincts and instruct her in the preparations for her confinement and for her child and in the upbringing of her family. It is in the provision of services such as these that the public clinics have been particularly successful, and it is by the failure to provide something of the same kind for his private patients that the medical practitioner has left a distinct gap in his ante-natal work. Matters of simple hygiene, advice on preparations and talks on mothercraft usually make the strongest appeal to the young mother and strike her as the part of ante-natal care that is most worth while. Especially to the strong and healthy woman in her first pregnancy, routine examinations and medical supervision generally often seem a needless fuss, whereas she may be greatly concerned about small details regarding arrangements for her confinement, provision for her child and its management after birth. So long as she is well and free from bodily discomforts, the offchance of some complication is too distant a prospect to worry her, and the immediate problem before her is what will suffice for her requirements, what she can make herself or what she must buy and how much she must pay.

At the hospital or public clinic there is a Sister Mothercraft, midwife or health visitor who will see the mother in her home and advise her on the matters that concern her and save her from wasting time and money unnecessarily. These services have not only a direct and immediate appeal, but the contact they make between the midwives and nurses of the clinic and the expectant mother offers many opportunities of obtaining an insight into the character and capabilities of the individual mother, her strength and weakness, and thus show where help is required and how the best can be got out of her. This more intimate association often leads the woman to confide in the visiting midwife and mention troubles and discomforts that she regards as beneath the doctor's notice or that may have escaped her memory in the excitement of the thorough investigation she underwent at her last visit.

It is now a platitude that successful ante-natal care should convince the expectant mother of the need for it and without making her think she is a sick woman, or a " patient " in the usual connotation of the word. The supervision must not only be efficient from the medical side, but must be helpful in other ways readily obvious to the supervised and adapted to her individual needs and circumstances. As soon as the educational and mothercraft side of ante-natal care is taken into account, the need for co-operation with a midwife becomes clear; likewise that without it the private practitioner cannot give services equivalent to those of the public clinics. He must take a leaf from their book and adapt it to the special requirements of his type of practice, if he is to compete with them in this regard. Further consideration of the medical services will show that a midwife or maternity nurse is almost as essential an assistant to the doctor in ante-natal supervision as for attendance during labour and lying-in.

The next principle to be emphasized is that ante-natal care, if it is to effect its purpose, must be thorough, i.e. the supervision must be close and inspections frequent. Taking the medical service alone, the first examination should be conducted as early in pregnancy as the patients can be persuaded to report and should include a general medical overhaul, search for focal sepsis (teeth, tonsils, vaginal discharge, urinary infections and so on), mammary examination, blood-pressure estimation, testing of urine and possibly blood (e.g. in suspected venereal disease). In the later months repeated abdominal examinations for obstetrical diagnosis will be required. The Interim Report of the Departmental Committee on Maternal Mortality and Morbidity suggested as the minimum scope of adequate ante-natal supervision (issued as a memorandum for those in charge of clinics) that the first medical examination should be at or before the 16th week, another at the 24th and 28th weeks, then fortnightly to the 36th week, and weekly from then to term. Without frequent examinations and constant observation, many conditions that arise rapidly or insidiously without symptoms, such as albuminuria and rise of blood pressure, may become serious within a week and the favourable moment for early treatment be lost. That conditions of this type are rare is no reason for neglect of constant supervision, as the practitioner's time and expense to the patient can be saved by using the services of the midwife for general supervision, testing the urine and even for blood-pressure estimations which are quickly learnt by any intelligent woman accustomed to such work.

Many defences, good and bad, may be made on behalf of the shortcomings of the ante-natal service in private practice, e.g. the difficulties of adapting clinic methods, the different type of patient dealt with, securing the right type of midwife, and so on. It may be said that private patients regard themselves as so sufficiently educated that many of the services mentioned are unnecessary. But there is no class that would not be the better for them, though there may be occasional individuals. One class that cries out for them more than any other and forms a material proportion of most practices is the professional or small fixed-income class, of varying degrees of education but unable to afford much in the way of domestic help. The mother may be anxious to nurse her child, but is in need of advice as to how it can be done with the least interference with her other duties; she must know how the work that falls on the mother who must do everything for her children can be made as little burdensome as possible. Many problems arise from the patients selecting their maternity nurses and refusing to accept one chosen by their medical attendant or entering a nursing-home recommended to them by friends but not approved by their practitioner. That there are grave hindrances in private practice, which do not exist in hospital or clinic practice, is undoubted, but none are insuperable, and one object of this article is to urge that an effort should be made to overcome them. If there is a nursing home within reach that will follow his principles whole-heartedly, arrangements might be made for the practitioner to conduct his ante-natal work there, both for patients entering the home for their confinement and for those who will be delivered at home, provided the nurse will be one of the midwives from the nursing-home.

The family practitioner, moreover, starts with a great advantage over the hospital or public clinic in his more intimate knowledge of the personality of his patients, for another principle in ante-natal care is that the co-operation of the patient is essential to its success. If co-operation between practitioner and midwife is important, even more so is that between the pregnant woman and those in attendance on her. Also it can be established only by a close understanding by her attendants of the individual characteristics and circumstances of each one under their care and a study of the response she makes. Thus time given to talks and discussions about the many trifles that occupy her mind is never in vain, and the care and thoroughness with which her case is investigated arouse in her the confidence in her attendants and in herself that is a necessary prelude to successful supervision.

As already indicated, the presentation to the woman's mind of child-bearing as a natural process must be a guiding principle throughout all talks and examinations. Most women have a proper perspective, but a material proportion approach pregnancy and labour with a view distorted by what they have heard or read of the terrors of labour, of its long duration and its dangers. Some may have had a previous unfortunate experience which has left a marked impression, or the pregnancy may be unwelcome, possibly even deeply resented and its termination unsuccessfully attempted, with an added fear that danger in labour is thereby increased or that the fœtus may be malformed. A not uncommon type requiring special management is that of the woman who looks on child-bearing as a burden and is unwilling to make any sacrifice she can avoid. These are examples of difficult cases requiring careful consideration from the psychological side, but all will benefit by confidential talks in which the woman can show what is in her mind and possibly reveal hidden dreads that otherwise she would keep to herself, thus possibly interfering in some way with normal function.

However thorough, no ante-natal examination will allow a prediction to be made with certainty that the labour will be easy and physiological. The woman may be physically strong and well formed, the presentation normal and examination disclose no cause of disorder of function, but, when labour has begun, the expulsive powers may be ineffective, and delivery ultimately terminated by the forceps. If the weakness of uterine function continues into the third stage, delay and hæmorrhage may also complicate it. Although the maintenance of normal function throughout the reproductive process is the primary objective of ante-natal work, the practitioner must be struck by the little help to be had in answer to the most outstanding question in midwifery: What are the factors that promote, and the factors that hinder, uterine action? It can safely be said that if the practitioner can succeed in getting his patients to respond to the education given in the ante-natal period he will increase his proportion of natural deliveries. By removing fears and anxieties and instilling in their place confidence in their power to see the business through themselves, some may be stimulated to follow the example of their maternal forebears and do with as little adventitious aid in labour as they had. Each one should be assured, however, that, although the more she herself can do the better, relief can always be given for the pains when they become too much for her and that she can place full reliance in her attendants for help when required. In first pregnancies the woman should be given instruction on the progress of labour so that she knows both what to expect and what is expected of her; particularly what happens during dilatation when the need is for her to relax and not to strain until the expulsive stage is reached. Some very valuable hints on these points may be obtained from a book by Dr. C. V. Pink[1] intended for the use of pregnant women to supplement advice given by their doctor. In it this writer describes his own method of trying to produce in his patients the attitude of mind that is most favourable to an easy and a natural delivery. He ends his instructions to the expectant mother by saying (author's italics) *that she will not suffer unbearable pain*, and adds, " If you are *very* successful, you will rather be *thrilled* by the so-called ' pains.' "

In order to emphasize the need for an effort to promote normal function in labour by ante-natal instruction, it may be well to consider the case of the women who select a midwife as their attendant, for, as a class, they show the largest proportion of normal labours. This class approaches child-bearing as being of the natural order of things and, without further thought in the matter, the women regard themselves as able to do the business themselves with the help of a midwife who can, however, call in a doctor in the event of accident or complication. As a class they offer a far simpler and a far easier problem than the women who engage a medical practitioner for the very reason that the latter expect much more in the way of artificial aid, such as anæsthesia and early delivery by the forceps. Statistics show that the midwife-employing class has a lower maternal mortality and a lower stillbirth-rate than the general rates for the country as a whole, and that those countries where attendance by midwives is the rule have lower mortality-rates than those where medical attendance is customary. The most obvious factor in the production of these differences is that of the attitude of mind in which the two classes of women approach child-bearing, normal function being thus attained to a much greater degree in the one group than in the other.

It is the child-bearing woman herself who determines the lower mortality in the lower social grades, and not the type of attendance. That there are many other factors in her make-up that play a part in this result cannot be questioned, e.g. her greater hardihood, greater power of withstanding pain, fatigue and the stress of circumstances generally and possibly, as often asserted, a greater immunity to infection; but her mental attitude (or perhaps absence of it) is a very material item among them. If this point is granted, it follows that the medical practitioner who has to deal with the more difficult type should seek some method to develop a state of mind in his patients more akin to that of the midwife-employing class, especially amongst those sufficiently educated to be responsive.

As the intention of this article has been to lay down the principles underlying ante-natal care rather than to go into detail, it is impossible to say more of instruction in general hygiene than that it is of supreme moment. The pervading idea is the same as elsewhere, and the pregnant woman must not think of herself as an invalid.

In conclusion, the importance of atmosphere may be emphasized, for the effect on the woman concerned is greatly increased by impressions of the same kind from all quarters and from all with whom she comes in contact. Atmosphere is not easily realized apart from an institution, but if, for instance, her practitioner sends her for ante-natal instruction to a nursing home imbued with his ideals, whose midwives and nursing staff are prouder of success in the degree of natural function attained than in the number of Cæsarean sections or other operations performed, the omens will be favourable for her following the usual custom of the place.

Reference

[1] Pink, C. V.: "The Ideal Management of Pregnancy." London: Cassell & Co. 1930.

The Treatment of Disordered Menstruation

By FREDERICK JOHN McCANN, M.D., M.R.C.P., F.R.C.S.

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IN no department of practice can prevention be more profitably employed than in the management of menstrual disorders. Girls and young women should be encouraged to seek medical advice when menstruation is absent, scanty, excessive, painful, or too frequent. When the orderly sequence of menstruation is disturbed injurious effects soon follow through the production of a vicious circle, the general health affecting menstruation and disordered menstruation affecting the general health. There seems to be a tendency at the present time to belittle the disabilities which disordered menstruation may produce and thus to neglect early and efficient treatment. On the other hand, to err in the opposite direction by encouraging a girl or young woman to regard her menstruation as a recurring disease is equally harmful. Those who do suffer at the menstrual periods are not capable of the same activity at these times as their more fortunate sisters, and they should seek treatment without delay. Indeed, the efficient treatment of menstrual disorders in early life would do much to diminish the sum of female suffering in later life, and would at the same time have an important influence on generative power. Parents, guardians, schoolmistresses, school medical officers and all those who have to supervise the upbringing of young girls should see to it that disordered menstruation is not overlooked but where possible is remedied at once.

MEASURES TO RESTORE OR TO MAINTAIN THE GENERAL HEALTH

Fresh air.—It is scarcely necessary to insist on the advantages of fresh air were it not for the fact that even now the ventilation of some schoolrooms, and still more, of some dormitories, is far from satisfactory. Girls coming from the country to cities often exhibit a deterioration in their general health accompanied by disordered menses. Living in a close atmosphere is especially injurious. They should be encouraged to seek the benefit of fresh air and should be discouraged from exchanging the atmosphere of the workroom or office for that of a badly ventilated picture palace or other indoor entertainment.

Diet.—Employers of labour are beginning to realize that the preservation of the health of the worker is a "paying proposition." To this end wholesome meals are being provided for female workers, and I have been informed that the resulting improvement in their health and working capacity has fully justified the experiment. The diet of school girls is in many instances far from satisfactory, the supply of good milk, good butter and good eggs is often lacking, while sugar and starchy foods are given in excess. Unless girls are suitably fed during the years of active bodily growth their reproductive system suffers, both menstruation and later generative power being affected.

Exercise.—A moderate amount of exercise is beneficial, but there is a tendency at the present time to go to excess, and when undue fatigue follows it is harmful. Complaint is not infrequently made by a worker that she is too tired after her work to take exercise, more especially where that work involves hours of standing on her feet, or, again, her tiredness may be due to the close atmosphere in which she works, or yet again both may play a part. Still, she should be encouraged to seek the benefit of fresh air by walking to or from her work (or a part of the way if the distance be too great), walking at least three or four miles every day. Those who are able to afford it can have the benefit of lawn tennis, golf, swimming, fencing, cycling or horse riding. Nevertheless, walking remains within the reach of all and is an ideal form of exercise. Physical exercises should be practised at home even if only for ten minutes each day, especially those concerned with the abdominal muscles, the muscles of the back, and the respiratory muscles, the correct method of breathing being most important. Each movement should be repeated three or four times and the same muscles exercised daily. Irregular or intermittent exercises are of questionable utility.

The action of the bowels.—The close relation between the large intestine and the genital organs renders necessary the careful regulation of the action of the bowels. The regulation of bowel action should never be omitted in any scheme of treatment, for constipation may hinder the efficacy of remedies which are only useful when the bowel action is normal. Moreover, the administration of a saline purgative before the onset of menstruation often exerts an important influence on the character of the menstrual flow.

Hygiene of menstruation.—Those who do not suffer during menstruation naturally resent any restraint upon their activities, but those who do suffer should avoid fatigue, both at work and play. Warm baths should be taken, or failing this, cleansing of the external genitals with warm water. Frequent changing of the diaper is necessary especially when the flow is excessive. The dirty diaper is a cause of a mild type of infection which is associated with the presence of a fœtid discharge at the termination of menstruation, and which is augmented in those of unclean habits. This constantly recurring infection is a factor in the etiology of female ailments which seems to have escaped observation. Yet I believe it to be of considerable significance, and in any circumstances it serves to emphasize the great importance of local cleanliness during menstruation. Cleanliness is a method of prevention capable of being practised alike by rich and poor. Cold baths should be avoided. Those who take a cold bath for the purpose of arresting or diminishing the flow expose themselves to the risks which may follow the sudden suppression of the menses.

MEASURES TO DEADEN OR TO DESTROY PAIN

Pain is the symptom which above all others prompts the sufferer to seek relief. The amount of pain—always difficult to estimate—varies from slight and transient to a severity which may truly be described as agony, and yet there may be no detectable pathological lesion. I am not here concerned with disordered menstruation in association with pelvic disease, but only with disordered menstruation for which no cause is discoverable by pelvic examination. Disordered menstruation associated with disease diminishes or disappears with the amelioration or cure of the disease of which it is merely one of the signs or symptoms. To relieve menstrual pain—dysmenorrhœa—numerous drugs are now available and each practitioner doubtless has a particular analgesic drug or combination of drugs on which he pins his faith. Ammonol, phenazone (antipyrin), aspirin, phenacetin, pyramidon, salipyrin are useful. It is a good plan to give a larger initial dose, e.g. ten grains—followed by five grains every hour for three doses if pain persists. The addition of caffeine or aromatic spirit of ammonia is helpful in tending to counteract the cardiac depression which may follow the use of phenazone or even of phenacetin or aspirin. Aspirin, grs. v, phenacetin, grs. v, and caffeine citrate, grs. ii, together form an analgesic compound of proved value. In cases of emergency when the pain is agonizing a more potent sedative, such as opium or one of its derivatives, may be required, but neither the drug nor the prescription should be confided to the care of the patient.

There are certain well known remedies, such as a purgative before the onset of menstruation, mustard foot-baths, hot applications to the hypogastric and lumbo-sacral regions, which all tend to ameliorate menstrual pain. Alcoholic stimulants should not be given on account of the danger of starting the "alcoholic habit."

DILATATION OF THE CERVIX

The relief of dysmenorrhœa by dilatation of the neck of the womb is a method of great antiquity, for it was recommended by Hippocrates. A hundred years ago Macintosh of Edinburgh claimed to have obtained permanent cures in 18 out of 20 cases of dysmenorrhœa by dilating the os uteri. He introduced very small probe-like sounds into the os, gradually using larger sizes in succession until the os admitted a staff the size of a No. 13 bougie or sometimes even a larger size. This method was adopted by Sir James Y. Simpson and was subsequently abandoned in favour of bilateral division of the cervix. Simpson found that gradual dilatation gave the patient so much pain and occupied so much time that he favoured the more rapid method of cutting the cervix.

At the present time the prevailing fashion is to dilate the cervix (with metal dilators) to the desired size under anæsthesia. This dilatation should be done very slowly so that the cervical canal is stretched and not torn and thus there should only be slight bleeding. If the cervix be lacerated, the lacerations bleed freely, while subsequent scar formation must militate against future success. Indeed, success depends in large measure on the degree of care with which the dilatation has been done. When difficulty is encountered in stretching the cervical canal or when dilatation has failed to benefit, the cervical wall anteriorly and posteriorly may be incised (from within the canal) in the middle line for two-thirds of its depth followed by the passage of a dilator of larger size and so avoid the tearing which would be produced by forcible dilatation.

In virgins these operations should be done without injury to the hymen.[1] Although I have always employed the method of dilatation under anæsthesia at one sitting, yet gradual dilatation by the daily passage of metal dilators or alternatively every second or third day might probably be more effectual and, if done carefully, is worthy of a renewed trial. After dilatation under anæsthesia I have seen serious consequences follow from the extent of the lacerations, from parametritis, and from infection ascending to the appendages. One of the most difficult operations I have ever been called upon to perform was for a densely adherent double pyosalpinx due to infection following dilatation of the cervix for dysmenorrhœa and sterility. Needless to say that all who attempt these so-called " minor operations " should see to it that due precautions are taken to guard against the possibility of infection. To curette the uterus for spasmodic dysmenorrhœa in addition to dilating the cervix is both unnecessary and undesirable. Severe dysmenorrhœa may be due to a small fibroid tumour embedded in the substances of the uterus or may be associated with uterine hypoplasia. On the other hand, long continued dysmenorrhœa may ultimately produce enlargement of the uterus. The fibroid tumour should, if possible, be enucleated, if not supra-vaginal hysterectomy will be necessary, and this operation may also be required for an enlarged uterus. Uterine hypoplasia is usually sufficiently benefited by glandular therapy to obviate the necessity for radical treatment.

MEMBRANOUS DYSMENORRHŒA

The passage of a cast of the uterine cavity during menstruation, although generally associated with pain, may be painless. This is membranous dysmenorrhœa and is not a disease, but merely an example of exalted physiological action. The amount of shedding or exfoliation of the uterine mucosa during menstruation varies in different women and in the same woman at different times. Some pass shreds and pieces, others portions of membrane, and again others membranous casts. In the same woman the severity of the pain varies at each monthly period. Membranous dysmenorrhœa is not always remedied after a pregnancy, nor even after subsequent pregnancies. Curetting, repeated if necessary, is claimed to be beneficial; and iodide of potassium and arsenic are useful. The older treatment by mercury in the form of vaginal pessaries and the application of silver nitrate to the endometrium once or twice in the interval between the menses was said to give satisfactory results. The painless passage of uterine casts does not call for treatment, for as already mentioned they are not the products of inflammation. It may be necessary to reassure the patient when the appearance of casts causes mental distress, even in the absence of pain. When pain can be controlled by suitable remedies, treatment applied to the endometrium is unnecessary. It is here interesting to reflect how the accepted pathology of a disease leads to corresponding changes in treatment.

INTERMENSTRUAL PAIN

This term is applied to a regular recurrence of pain in the middle of the interval between each menstrual period. The pain is referred to the internal genitals, and may last a few hours or for one, two, or three days, and is occasionally accompanied by a slight discharge of blood. This pain must not be confounded with pain or discomfort beginning regularly a week or ten days before the onset of menstruation, for the victims of middle pain often have little or no discomfort immediately preceding or even during menstruation. The periodic ripening and bursting of the Graafian follicles is assumed to be the cause of middle pain. Chronic inflammation of the uterine appendages has been present in some of the cases I have seen, in others no local cause was detected. The inflammatory cases are benefited by ichthyol treatment and the others by glandular therapy.

MEASURES TO INITIATE OR TO INCREASE MENSTRUATION

A periodic discharge of blood from the genital passages being the outward and visible sign of menstruation, the quantity and character of that discharge is accepted as evidence of the manner in which this function is being performed. During menstruation there is a widespread disturbance throughout the body which may only become manifest when the menstrual function is not working smoothly. Headaches (often severe), vasomotor phenomena, enlargement of the thyroid gland, irritability, nervousness, depression, may assert themselves and compel attention. Endocrinology has been helpful in this regard, for by the administration of certain glandular preparations, notably those of the thyroid gland, many of the symptoms can be controlled. An effort should be made to discover if there be evidence of excess or diminution in the secretion of any of the ductless glands in all women with disordered menstruation. Much still remains to be elucidated, for even such a common symptom as headache not infrequently defies adequate explanation.

AMENORRHŒA

Absent or scanty menstruation is frequent in young girls suffering from anæmia and chlorosis, and when the anæmia is cured menstruation becomes re-established. Climate and environment have an important influence. High altitudes may cause the arrest or diminution of menstruation or a change from country to town life may be followed by a similar result, or again, a change from one locality to another. Painful menstruation may be affected in like manner.

I have elsewhere[2] described in detail the treatment of amenorrhœa associated with anæmia, and shall now pass to the consideration of amenorrhœa where obvious signs of anæmia are absent. Robust, apparently healthy young women may complain that the menses had never appeared or that they had appeared once or oftener and then had become arrested.

In this country menstruation usually begins at from fourteen to sixteen years of age and ends from the fortieth to the fiftieth year. There are, however, variations within normal limits both in earlier and later appearance and in earlier and later cessation, but these do not call for treatment. Examples are met with in which physiological limits are exceeded and advice is sought because of delayed appearance of the menses, delay even to the twentieth year or later; or again, the menses may have appeared once or twice and then ceased for several months or years. A constitutional cause may be discoverable or some febrile disorder in childhood may have left its imprint, or again appendicitis with pelvic peritonitis, but there still remain cases without any such explanation. The delayed appearance of the menses may occasionally be noted in more than one member of the same family without any morbid local or constitutional cause, and I have seen it in female twins. The possibility of tuberculous infection in childhood must not be overlooked, for one woman aged 35 years who had never menstruated had tuberculous peritonitis in childhood and I had the opportunity of inspecting through an abdominal incision the destruction of the genital organs produced by tubercle, which of all infections is the most potent in this respect.

To initiate menstruation, if and when it is desirable, will tax the therapeutic ingenuity of any practitioner. It is true that some cases are cured in time, and for this reason caution must be exercised in appraising the value of the remedies employed. Erotic excitement is the best emmenagogue, and cases are cured by marriage. Pregnancy may occur although there never has been any visible sign of menstruation. Periodic efforts at menstruation (menstrual molimena), sometimes accompanied by a leucorrhœal discharge, are not uncommon. It therefore seems reasonable to attempt to restore Nature's periodicity where the menses are absent by employing every month on a fixed date and for two or three days those measures which appear to be helpful in suppressed menstruation. Hot mustard foot baths, poultices or hot fomentations to the hypogastrium, hot hip baths, are all of service, and for those who have a monthly molimen these remedies should also be employed at that time. Pills of aloes and myrrh given each night for three nights to promote the action of the bowels are also useful.

The whole group of emmenagogues is of doubtful utility, and it is difficult to believe that such a complex and far reaching bodily function as menstruation could be roused into activity by a drug merely acting directly or more often indirectly on the uterus, and I must here confess my profound disappointment with the results which are obtained from the administration of certain glandular preparations freely advertised as efficient. Thyroid preparations still maintain the foremost place not only for their efficacy but also for their reliability. At the same time it is well to continue using that type of preparation which has stood the test of experience. For many years I have insisted on the value of small doses of thyroid, for the continuous administration of a small dose is not, or is rarely, followed by symptoms necessitating a cessation of the treatment, and thereby a substitution for deficient or absent secretion is established. Thyroid given in

$\frac{1}{2}$ grain doses at bedtime or even $\frac{1}{4}$ grain is sufficient in the vast majority of cases. If there be signs of excess then the thyroid should be omitted for a week or two or a smaller dose, $\frac{1}{5}$ or $\frac{1}{10}$ grain, substituted. A larger dose is rarely necessary and one grain daily should be the limit. It is an interesting observation that beneficial results are obtainable by small doses where large doses sometimes fail. Ovarian preparations, whether of the whole substance or of the corpus luteum, have in my hands been uniformly disappointing. Some of them caused indigestion, but otherwise I could not satisfy myself that they produced any effect. When ovarian preparations were given combined with thyroid I have not observed any increase in efficiency. Let me here deprecate the use of "endocrine bombs" containing a variety of gland products; most of these products are in all likelihood inert and when the "bombs" possess any therapeutic value it is due to a small dose of thyroid which some of them contain.

When the menses have appeared once or twice the problem is not so difficult and the outlook correspondingly improved. In such cases there may be a constitutional cause and I have seen in recent years amenorrhœa follow severe influenza. Many infections do appear to exert an injurious influence on the ductless glands, which continues for a considerable time after the cause has disappeared. Indeed, in not a few instances the reproductive system suffers under the strain, for not merely menstruation but generative power is affected. The influence of shock and fear on the reproductive system is well known in animals. In women amenorrhœa may be so produced, and I recall one example where after a severe shock menstruation ceased for three years, and continued for another three years after marriage.

This woman was treated with iron, arsenic and large doses of thyroid without any apparent benefit. When I saw her she did not appear to be anæmic and, as far as I could ascertain, had not suffered from anæmia. Small doses of thyroid were given to her and a suitable combination of remedies, with the result that her menses reappeared and she later became pregnant and gave birth to a daughter. She now menstruates regularly and is the mother of three children.

A premature menopause is sometimes a source of considerable distress, especially to a young woman, and when atrophic changes are found in the uterus, and especially in the upper segment of the vagina, treatment is useless. Thus it is urgently necessary to begin treatment at once before such changes are produced, for the prognosis in these circumstances is more favourable. When, however, the menstrual cessation occurs a few years prior to the age of the natural menopause no treatment is required. Lactation atrophy or super-involution of the uterus is also favourably influenced by treatment, and menstruation may be restored. The effect of reproduction on subsequent menstruation is a subject full of interest. There is difficulty in determining whether infection or some other morbid influence is at work producing the amenorrhœa. Occasionally after the birth of a child menstruation never reappears; usually, however, the reappearance is delayed for varying periods of time even in those who do not suckle the child.

Retention of the menses.—When the outflow of the menstrual discharge is prevented by an obstruction, congenital or acquired, menstruation is said to be retained. In brief, the treatment is to remove the barrier and allow the fluid to escape. When this cannot be done it may become necessary to remove the uterus and/or Fallopian tubes when distended with menstrual fluid. It is essential to examine the abdomen of every patient before prescribing for amenorrhœa, and to make a rectal examination in virgins and a bimanual in married women, always remembering that sudden cessation of menstruation in a previously healthy young woman suggests pregnancy.

MEASURES TO DIMINISH THE MENSTRUAL FLOW

The increase of the menstrual flow is termed menorrhagia yet what is excessive for one woman may be normal for another. It is the continuous loss of fresh blood that matters and inquiry should always be made as to the number of days during which red blood is passed. A flow of dark blood for several days, or more commonly dark sanious fluid, implies that clots are being gradually broken up and expelled or that there is some hindrance to a free exit. Morbid causes, both local and constitutional, are at work in most examples of menorrhagia and its occurrence in anæmia is not rare. But here I am chiefly concerned with those cases in which local causes can be excluded. Of these the best examples are met with at puberty when menstruation begins with profuse even alarming blood loss. The cause of this is not known; it is assumed to be due to some endocrine disturbance. Rest in bed, thyroid in small doses and calcium lactate are most beneficial. Curetting is recommended but I have not yet found it necessary. Menorrhagia is often cured by marriage, and it is probable that certain examples amongst the unmarried are due to abnormal sexuality. Excess of ovarian secretion is offered as the explanation. Here again thyroid and calcium are of value but occasionally these fail and then radium—with careful regulation of the dosage—is the best treatment. Curetting as a rule fails or may even increase the blood loss.

Menstruation may terminate with menorrhagia, but there is always the possibility that the increased blood loss is due to some local cause. Both free loss at the menopause and the continuance of "menstruation" beyond normal limits should give rise to the suspicion that cancer is present and it is imperative that the diagnosis should be definitely settled before treatment is prescribed. After both local and constitutional causes are excluded there still remains a residuum of cases where the bleeding is comparable to that at the onset of menstruation. These cases are benefited by thyroid and calcium, and ergotine senecin compound or stypticin are useful hæmostatics. The use of radium in those resistant to this treatment prevents the necessity for hysterectomy. In cases of emergency when the bleeding is excessive or alarming the woman should be kept absolutely still in bed, should be given ♏xx of Battley's solution (liq. opii sedativus) and the vagina should be tightly plugged with antiseptic gauze. When local or constitutional causes are at work they must be combated, for here the increased blood loss is merely a sign.

References

[1] McCann, F. J.: " The Treatment of Common Female Ailments," 2nd ed., London, p. 20.

[2] *Ibid.*, p. 14.

The Place of Surgery in Gynæcology

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FROM being a branch of medicine almost entirely in the hands of physicians, gynæcology has become a well recognized branch of surgery by reason of the increasing power of surgeons to deal with pelvic diseases, and the success which follows operative treatment. Perhaps in no other corner of the body has the ingenuity and enthusiasm of the surgical mind had greater scope. With the confidence which comes from growing skill the gynæcological surgeon has followed the simple pioneer work of 30 and 40 years ago by devising an ever increasing catalogue of operations, such as those for the different varieties of prolapse, which have greatly increased our power for treatment.

The first problem that confronts us is whether any given patient should be treated by operation or other methods. Apart from the question of whether she is a suitable operation risk, and careful examination of all physical signs, we have chiefly to assume a proper sense of proportion and ask ourselves whether the abnormal condition discovered can be incriminated as a real and sufficient cause of the symptoms described, and secondly to decide upon the ideal operation to meet the case.

Probably no branch of medicine offers greater difficulty than gynæcology in the decision upon the value of operative treatment for many of its patients. Perhaps more in the practice of gynæcology than any other branch of surgery, do nervous or neurotic conditions intrude, closely simulating the symptoms caused by organic conditions, and occasionally very difficult to diagnose with certainty. Indiscriminate operations done for these patients are certain to end in disappointment, and frequently leave them worse than before, and start a series of operations, each of which is less necessary, or more harmful, than the one preceding.

Let us first consider in more detail the so-called neurotic woman with multiple pains, the chief of which is referred to the pelvis, nervous, frightened, and tired. The specific complaint is often backache, with, perhaps, dyspareunia and menstrual disorders. This patient may belong to one of two categories. The first, and largest, comprises those patients whose neurosis is derived from non-organic causes, the commonest of which is an anxiety or fear of one kind or another, while the second includes a comparatively small group of women whose symptoms arise primarily from some organic condition in the pelvis and, by their long duration, induce a secondary state of fatigue, anxiety and depression. This clinical type closely resembles the first in symptoms, but physical examination will discover some adequate pelvic lesion. Successful treatment will primarily depend upon the diagnosis of this adequate cause, and much of the value of experience is the ability, not so much to find a lesion, as to assess it. Few of us have expert knowledge of the neuroses or psychology in general, but we should all be sufficiently acquainted with this most important branch of medicine to enable us to recognize a neurosis as a primary anxiety state or a fatigue secondary to physical abnormalities.

Let me illustrate by consideration of a common condition: A nervous, worried and tired married woman who has had children complains of dyspareunia. In addition there will be less defined symptoms referable to almost every part of the body, such as backache, headache, dysmenorrhœa, flatulent dyspepsia, insomnia and depression. Now we know that dyspareunia is often a symptom unconsciously adopted as a defence against the unwelcome attentions of a husband who, for some irregularities, perhaps, has ceased to inspire affection. Infidelity, real or suspected, will excite anxiety, unhappiness and horror. The shattering of an ideal will loosen the hold on life and shake its foundations. It is not unlikely, therefore, that a woman who suffers so severe a stress should develop nervous fatigue which will quickly produce the physical symptoms I have described. But amongst them dyspareunia is likely to stand out as the chief trouble. Bimanual examination of the pelvis in this patient will be difficult and painful. The gentlest efforts will cause a discomfort out of proportion to the disturbance. The uterus will be of normal size, and possibly retroverted, but freely movable. Pain will be caused by moving the cervix, and by palpating the fornices in any direction. An ovary may be felt prolapsed, but its tenderness is not greater than that of any other part of the pelvis. The characteristic feature of the pelvic examination is universal tenderness, and pain produced by the most careful palpation.

The second example is again a married woman who has had children, complaining of dyspareunia. As in the last patient she also seems worried and suffering from the general effects of worry, but the outstanding complaint is dyspareunia dating usually from an event which is known to be a frequent starting point of the symptom, such as a septic abortion, pelvic peritonitis, or a confinement complicated by a sub-involuted uterus. In describing symptoms, dyspareunia is incriminated as the primary cause of her anxiety, while the first patient will mention dyspareunia as a slowly developing symptom in a large group of the other troubles. Physical examination will find a lesion having its own well defined tenderness, and there will be sufficient pathology to account for as much tenderness or pain as the patient describes. For example, the uterus again may be retroverted, but in addition to being tender, it will be enlarged and apparently fixed, and the woman will know at once the moment the examining finger touches it, while palpation of the other parts of the pelvis will not be noticed. If in addition there are enlarged, tender and prolapsed ovaries, with possibly infected and palpable tubes, the organic origin of dyspareunia needs no further consideration. This woman obviously requires local pelvic treatment, sometimes rest and palliative measures, but more often a curative operation.

I have discussed in some detail the types of patients complaining of dyspareunia because they illustrate well my description of the two fundamentally different types, but gynæcology contains many other examples where a very careful examination must be made of the patient's family history and relations, her mode of life and temperamental constitution, as well as the physical examination of the pelvis, before it is proper to advise operative treatment.

Having briefly considered the difficulties presented by the neurotic patient, we have next to consider, first, how far organic conditions can be corrected by surgery, and secondly the right type of operation to select.

There are some conditions about which there is general agreement that operation is by far the best treatment. For example the majority of all cases of genital prolapse, most cases of fibroids which cause symptoms, and collections of pelvic pus. But there are others, such as menstrual disorders, retroversion of the uterus, carcinoma of the cervix, leucoplakia of the vulva, about which there are differences of opinion.

Probably the most commonly performed of all pelvic operations is dilatation and curettage. Its frequent practice is partly due to its ease and comparative freedom of risk, and partly it is a heritage from the days when operative gynæcology was largely confined to vaginal methods. The old ideas of the pathology of endometritis were also responsible for the widespread practice of curettage, for they described a number and variety of morbid conditions of the endometrium which we now know to be nothing more than the physiological changes of the menstrual cycle. It is natural, therefore, that an imperfect understanding of the pathology should have misguided the use of the curette.

The use of the curette is inversely proportional to the gynæcological experience of the operator. It is important to remember that its sole function is the removal of the endometrium, and, unless this is abnormal, the instrument can have no proper use. If, however, the endometrium is abnormal then the curette frequently, though not always, has a useful therapeutic value. It is surprising, even when the symptoms seem to be concerned with the endometrium, as, for example, in some forms of menorrhagia, that it presents no abnormality, even on careful histological examination. Menorrhagia of young adult women and adolescents is seldom improved by curettage, and frequently the hæmorrhage of chronic metritis is worse after the operation. But in some well-defined conditions it is the only cure. Chief among these are the menstrual excess and irregularity following abortion and labour, especially if these were complicated by mild local infection of the uterine cavity. Here we have a true chronic endometritis of inflammatory origin following directly upon an acute infection. It is obvious, too, that polypi of various kinds, particularly the placental polypus after abortion, can be efficiently scraped away with the curette. Not only is the instrument often quite useless, but at times it is used with the utmost danger. During any acute infection, however mild, after labour and abortion the curette is likely to convert a local into a generalized infection, and, therefore, should never be used. It is also used with considerable risk if a chronic salpingitis is present, and is not without danger when passed through a cervix which is freely discharging muco-pus.

As a diagnostic instrument in cases of suspected carcinoma of the body of the uterus the curette is often an essential instrument. An illustration of our changing views is the answer given by the candidate sitting for the examination in gynæcology. When given a curette and asked what is its function he usually describes it first as a diagnostic instrument.

Another operation which is commonly performed and often disputed is amputation of the cervix. It has long ceased to be a treatment of carcinoma, and is now only practised for leucorrhœa, erosions, tears, and conditions which may, perhaps, be inaccurately called precancerous. As a part of the operation for severe prolapse it is done with a different object, namely, the removal of a greatly hypertrophied or elongated cervix. My own view is that for all those conditions described above, causing a distressing leucorrhœa, especially if there is a serious ectropion of the torn lips, the best of all operations and treatments is amputation. In these cases medical treatment gives no hope of success, and plastic operations on the tears are liable to imperfect healing. Moreover, trachelorrhaphy leaves behind the infected and discharging cervical canal.

When the cervix is wholly amputated just below the level of the internal os by a neat, clean operation, the patient can be assured that the discharge will disappear within about two months, sometimes earlier, and that a dangerous portion of the womb will no longer be a menace to her. Success is judged by the disappearance of leucorrhœa, and in the large majority this is the result. Failure is liable if the cervix is not removed at a high enough level, or if by ragged incision of the vaginal wall the suture line at the end of the operation is uneven, and an incomplete covering of the cervical stump. It is urged against the operation that secondary hæmorrhage often occurs, sterility may be caused, and labour may be difficult, and that dysmenorrhœa may follow due to a cicatricial contraction of the new os. All these things can happen, but if the operation is done properly, for example, if a wide dilatation of the cervix is first obtained, all bleeding firmly arrested by ligature and suture, and the cut edge of the vagina is not tucked into the new external os, the complications are remarkably few. So many gynæcological patients are the victims of the cervix, so much minor worry and discomfort is caused by vaginal discharge, and medical treatment so commonly fails that I have no hesitation in advising amputation in a large proportion of cases.

On the subject of operative treatment of uterine displacements a whole article could be written. The older textbooks have long descriptions of the different varieties of retroversion and retroflexion, according to the exact anatomical position taken up by the cervix and body, while the number of operations designed for their correction is out of all proportion to the clinical importance. The questions which arise are, firstly, if retroversion should be corrected, secondly, whether they should be treated by pessary or operation, and thirdly, what variety of operation is the best.

I have already touched on this problem earlier in this article, and I can only repeat that every care should be taken to be sure that symptoms are actually caused by the backward position of the uterus. It is not enough that the patient has backache, or vague abdominal pain, or even sterility. There must be physical signs commensurate with and corresponding to the symptoms. For example, retroversion in a young single woman rarely, if ever, needs attention even if she has dysmenorrhœa. In other cases if the uterus is freely mobile, insensitive and not enlarged its position is of no importance. Surgery is, however, usually necessary if, after an abortion or childbirth, the uterus is found to be bulky, completely retroverted, low lying, very tender, and apparently (though seldom actually) fixed. Here there are symptoms which correspond to the pathology. Chief of them is dyspareunia, backache on standing, relieved by lying down, and menstrual disturbances. Medical treatment for this well-defined condition usually fails because of the long period of rest that is necessary. An operation can be counted on curing the patient, but it is necessary that it should be comprehensive or it will fail. Ventro-suspension only of the uterus is not enough. Curettage should first be done, followed by a plastic repair of the perineum if, as usually, there is a vaginal prolapse. The abdomen should then be opened, and the uterus suspended by shortening of the round ligaments. If, however, prolapse is the primary condition with retroversion only a secondary or incidental condition, causing no special symptoms, then replacement of the uterus can generally be effected by a wide plastic operation on the vault of the vagina, with or without amputation of the cervix.

Retroversion also becomes important in operations for salpingitis. The uterus, if not removed, should always be suspended after removing both adherent tubes which leave a raw area in the pouch of Douglas and on the anterior wall of the rectum. Otherwise adhesion of the heavy uterus will fix it in the cul-de-sac, with the certainty of dyspareunia and very probably a continuance of menstrual disorders.

In general, I would say that fixation operations for backache alone are not often required. Where backache is the chief and primary symptom it is seldom that the pelvic organs can be the cause. Where, however, there is backache on standing, and relieved by lying down, there may, though not necessarily, be one or other form of prolapse, sometimes associated with retroversion. But the real cause of the backache is due more to prolapse and less to retroversion, and any operation which fixes the uterus and neglects the perineum is bound to fail.

Let us pass on to the consideration of hæmorrhage during the latter half of the child-bearing period. Hysterectomy has now serious competitors in radium and X-rays, and for certain conditions there is no doubt that the newer methods have definitely displaced operation. I feel, however, that there will be a small swing of the pendulum back towards the use of hysterectomy where radium or X-rays are now often used. The cases fall into two main groups. In the one group there is excessive and perhaps irregular uterine bleeding in women over 40, with no physical signs except, perhaps, a little firm enlargement of the uterus. They are usually diagnosed as metritis, the result of sub-involution and are properly treated by radium insertion after curettage to remove possible polypi. With proper dosage the results are excellent. At no risk, with little or no convalescence, the hæmorrhage is usually entirely arrested.

In the second group the uterus contains fibroids which may be intruding into the cavity. With few exceptions I believe that ray methods of treatment are bad. An exception may be made at once. The woman who has small tumours, with menstruation sufficiently regular to make it improbable that she has a fibroid polypus or submucous fibroid, at or about the menopause is not an unsuitable subject for X-rays, but if there be suspicion of an intra-uterine polypus, or the bleeding is irregular and long continued, there is no doubt that hysterectomy is the better treatment. It is true that there is a definite primary mortality following the operation, but there are also real failures in treatment of hæmorrhage by radium which may produce serious secondary results. It is not enough to incriminate the dosage, as if this were a matter for exact computation. Too little exposure will increase the bleeding, while too much is liable to cause sloughing and intractable discharge. A further point which should be considered is the condition of the cervix; where that is enlarged, torn, and discharging muco-pus, hysterectomy is the only treatment when considered against radium or X-rays.

X-rays are perhaps seen at their best for women suffering from a delayed menopause with excessive but regular menstruation and pronounced nervous symptoms. For these patients operation is entirely unnecessary, while X-rays will give a remarkably quick relief.

There are many cases of fibroids in which opinions on the advisability of operation must differ, but so long as there is difference of opinion on any one case there is unlikely to be any urgency for operation. Time will, sooner or later, clear up the doubt. But the sharpest differences are likely to occur on the variety of operation to meet some individual cases. Sub-total or total hysterectomy and myomectomy may all be considered. Myomectomy lends itself to extravagances of technique which may have little or no relation to the clinical condition of the patient. In some of the younger patients with solitary or few fibroids the operation is a very valuable treatment, but to shell out innumerable little tumours from the uterus of a woman over forty reminds one of an exercise in the operative surgery class, and is an example of a crazy devotion to technique at the expense of all clinical judgment. A discussion on the place of surgery in the treatment of salpingitis might well take up a whole article. For acute infection of the tubes at the first attack operation is entirely unnecessary for the mild catarrhal case, but for the severe types of suppurative salpingitis with peritonitis, especially after labour or abortion, I still believe that laparotomy, slitting up the tubes and drainage, is the best treatment. For the chronic disease each case must be considered on its merits, having due regard to the social and economic conditions. The question largely resolves itself into the incidence of relapses. Should the thickened tubes cause few symptoms, and should the patient be able to lead an easy quiet life it is not necessary to operate; but if the patient is compelled to work, and if occasional exacerbations of pain with temperature and bleeding spoil her life, then the tubes, and usually the uterus with them, should be removed.

The indication for operation also depends upon the severity of associated menstrual disorders, as well as upon the liability to relapses of acute attacks. The menorrhagia and dysmenorrhœa may by themselves be sufficiently incapacitating to demand a curative treatment, and if this is the case, only surgery can meet the case. The treatment of chronic salpingitis affords good examples for the illustration of the value of radical methods, and the place of conservatism. The more I see of this disease causing recurrent symptoms, the less patience I have with medical or palliative treatment. We all know how remarkably enlarged tubes will shrink and disappear as palpable swellings during convalescence from an acute attack, but if, when the resolving process has exhausted itself, the tubes are still palpable as tender swellings and remain so while under prolonged observation, I have no hesitation in recommending their removal, together with the upper part of the fundus of the uterus.

Genital Prolapse

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THE various lesions which comprise genital prolapse are of such common occurrence in general practice that no symposium in THE PRACTITIONER devoted to gynæcology would be complete without some reference to them. It has been said there are only two classes of women, those who complain of backache and those who do not. There is certainly a large and important class who complain of falling of the womb, bearing down, or some other of the many symptoms associated with downward displacement of the pelvic organs.

Prolapse of the uterus, genital prolapse, or sacro-pubic hernia is a condition which may affect the whole of the pelvic organs and not merely the uterus. That this is not always recognized is shown by the fact that gynæcologists are frequently asked to remove the uterus in order to cure so-called falling of the womb. It is true that after such an operation the uterus cannot fall again, and to that extent the patient is cured; but other structures, such as the bladder and vagina, will continue to descend and her condition may be actually worse than before.

In order to understand how prolapse occurs it is necessary to have some knowledge of the various structures which support the organs resting upon or passing through the pelvic floor, but a brief mention of these will be sufficient for the purpose of the present article.

By far the most important is a mass of fibro-muscular tissue which extends inwards from the lateral walls of the pelvis and is firmly attached to the sides of the cervix and upper third of the vagina. An extension of this tissue forwards under the bladder, and called by some authorities the pubo-cervical muscle, forms the principal support of that viscus. Less important are the levator ani muscles lying at a somewhat lower level and the superficial sphincter layer surrounding the vulva and anus. So long as the fibro-muscular tissue remains intact injury to the levators will have no serious effect on the position of the pelvic organs and damage to the perineum and superficial sphincter layer will merely lead to enlargement of the vaginal orifice and weakening of the supports of the lower part of the vagina and urethra.

CLASSIFICATION

From an anatomical point of view, cases of genital prolapse will be found to belong to one or more of the following groups: (1) cystocele; (2) classical prolapse: (*a*) incomplete, (*b*) complete; (3) vault prolapse associated with congenital elongation of the cervix; (4) prolapse of the posterior vaginal wall, including rectocele; (5) dislocation of the peri-urethral wedge.

(1) In cystocele there is bulging of the anterior vaginal wall and a downward displacement of the bladder through the pubo-cervical muscle.

(2) In classical prolapse there is descent of the anterior vaginal wall beginning below and extending upwards to the cervix, traction on the cervix, retroversion and descent of the uterus and, finally, descent of the posterior vaginal wall beginning above and extending downwards. In this variety cystocele is usually present, also descent of the pouch of Douglas with its contents. If the perineum is intact the rectum and lower third of the posterior vaginal wall are unaffected, but otherwise complete prolapse of that wall and possibly rectocele may occur. In the great majority of cases the structures lying behind the prolapsed posterior vaginal wall are extra-peritoneal fat and the contents of the pouch of Douglas. Complete

classical prolapse is commonly called procidentia.

(3) Vault prolapse with congenital elongation of the vaginal cervix is of special interest as it is the type usually met with in nulliparous women. Here the long cervix descends first and drags down the vaginal fornices behind it.

(4) True rectocele is comparatively rare as normally the rectum is firmly fixed to the sacrum and has only a loose attachment to the middle third of the vagina in front. Moreover, the anal and vaginal canals are separated from each other by the perineal body to which both are firmly attached. Damage to the perineum, however, may result in adhesion between the two canals, and then both may descend together and form a rectocele.

(5) Dislocation of the peri-urethral wedge is frequently associated with true prolapse, particularly cystocele, but is really a separate lesion affecting the supports of the urethra, including the extrinsic vesical sphincter.

ETIOLOGY

Sagging of the fibro-muscular supports of the pelvic organs is the essential cause of prolapse and in the great majority of cases this follows the strain thrown upon them during labour. Increased intra-abdominal pressure from other causes such as hard work, chronic bronchitis or constipation, may also play a part, especially if the supports are already weak as a result of poor development or faulty nutrition. All forms of prolapse are commoner in industrial areas and amongst the poorer classes, and particularly so in Lancashire on account of the hard work in the warm, humid atmosphere of the weaving-sheds and the necessity, for economic reasons, to return to work too soon after the confinement.

The surest way to produce prolapse would probably be to deliver with forceps before the ring of the cervix had passed above the fœtal head, but it is doubtful if this particular method of delivery is responsible for many cases as forceps are seldom applied under such circumstances, and 40 per cent. of all prolapses occur in women who have never had any instrumental interference at their confinements. Dislocation of the peri-urethral wedge is also intimately bound up with childbirth and is probably due to the child's head being forced out too close under the pubic arch as it might be by over enthusiastic efforts to save a perineal tear by continually pressing the head against the tissues of the vestibule or perhaps by misdirected traction with forceps at the pelvic outlet.

The commonest variety of nulliparous prolapse is that associated with congenital elongation of the vaginal cervix, and in these cases one must suppose that the latter acts as a foreign body which as it is extruded drags its vaginal attachments and, therefore, the vaginal vault along with it. Occasionally, however, one does meet with the ordinary varieties of prolapse in nulliparæ, and then hard work and unhygienic surroundings acting perhaps on a weakened pelvic floor must be the determining factors.

SYMPTOMS

The symptoms of prolapse are many and various, but may be conveniently classified as follows:—

(1) *Pain.*—(*a*) "Bearing down." It is difficult to understand the exact nature of this symptom, but patients usually describe it as a pain. (*b*) Backache. This is a very common symptom in the earlier stages of prolapse and is a pain referred to the sacral region, and probably due to muscle strain following upon the efforts of the supporting structures to keep up the affected pelvic organs. That this is a reasonable explanation is shown by the fact that backache is rarely met with in complete prolapse where the supports, so to speak, have given up the struggle. The uterine retroversion frequently associated with prolapse is

not the cause of the backache, and it cannot be too strongly stressed that the back does not ache simply because the uterus happens to be in a backward position. Backache in women is met with just as frequently when the uterus is in its normal forward position. (*c*) Dragging pain in the lower abdomen or groins due to stretching of the upper attachments of the pelvic organs. (*d*) Soreness in the vagina in complete cases due to ulceration or infection.

(2) *Presence of a swelling.*—" Falling of the womb " is complained of. The patient states that there is a " swelling in the privates " or that " the womb comes right outside."

(3) *Disturbances of micturition.*—This is an important group of symptoms and worth considering in some detail. (*a*) Frequency: The patient is always wanting to pass urine. This is probably the commonest symptom of prolapse in its earlier stages, but may occasionally be due to associated lesions of the bladder. (*b*) Urgency or precipitancy: When the patient wants to pass urine she must go quickly or she wets herself. This is also an important symptom and due to relaxation of the bladder supports. (*c*) Difficulty : Common in the severer types of prolapse and may amount to difficulty in starting the act or inability to pass urine until the prolapsed organs have been pushed up. Difficulty of this kind can be easily understood when it is remembered that in bad cases of cystocele and in cases of complete prolapse a large part of the bladder lies below the level of the urethral orifice. (*d*) Diurnal or stress incontinence: The patient has poor control over her bladder sphincters when going about. Laughing, coughing and sneezing will cause the urine to escape with some force from the urethra, also walking down hill or down stairs or along a rough road. This is not a symptom of true prolapse, although it is complained of in 10 per cent. of all cases, but is due to dislocation of the peri-urethral wedge and consequent

weakening of the bladder sphincters by interference with their attachments.

(4) *Discharge.*—Exposure of the prolapsed vaginal walls and hypertrophy of the cervix may lead to an increase of the normal secretions, leucorrhœa. A purulent or even foul-smelling discharge may follow ulceration, with subsequent infection. Sometimes the discharge is blood-stained, and a history of this given before the patient is examined may lead to a suspicion of carcinoma. In this connection it is well to remember that occasionally some malignant change may be associated with the ulcerated condition of the cervix.

DIAGNOSIS

This is generally easy, but it is advisable to make a thorough investigation of the bladder and rectum, as well as of the genital organs. Abdominal examination must not be omitted, as occasionally a large tumour may be present and be partly responsible for the genital prolapse or for some of the symptoms complained of.

On inspection of the vulva there will usually be some considerable relaxation of the vaginal orifice. The presence of signs of irritation or infection in that region should be noted as "bearing down" may be due to that and not to any true prolapse. Inspect the condition of the perineum and see if there is any bulging of the lower part of the posterior vaginal wall. The patient is next asked to cough or to bear down, when the degree of descent of the affected structures will be noted. It must be remembered that the displacement may not appear so great as it would be if the patient were actually on her feet and about her various household duties. If prolapse is present, observe the sequence of events as the patient bears down. Is there only a bulging of the anterior wall, cystocele? Is there descent of the anterior vaginal wall followed by the uterus and a variable amount of the posterior vaginal wall, classical prolapse? Does the long cervix appear first, followed by the upper part of the vagina, vault prolapse? Does the posterior vaginal wall only appear, prolapse of the posterior cul de sac or rectocele? Does the peri-urethral wedge "wheel" round the under-edge of the symphysis pubis? In this last variety of prolapse it will also be noticed if the urine squirts from the urethra when the patient coughs or strains.

The next step is to make the ordinary bimanual examination in order to confirm the findings already made on inspection and to ascertain the condition of the cervix, body of the uterus and appendages. In classical prolapse there is usually some hypertrophy of the vaginal cervix, together with elongation of the supra-vaginal portion. In some cases an ulcerated area will be found on the cervix or one or other vaginal wall. The body of the uterus is usually retroverted and may or may not be enlarged. In cases of complete prolapse the uterus may lie completely within the procident mass and outside the vulva. In vault prolapse there is elongation of the vaginal cervix.

Two other procedures are necessary to complete the internal examination. Pass a catheter into the bladder and ascertain if it can be made to enter the swelling under the anterior vaginal wall. If so the diagnosis of cystocele is confirmed. If the patient complains of diurnal incontinence test the strength of the vesical sphincters by noting the amount of resistance to the passage of the catheter into the bladder. The sphincters of the female bladder are usually described as being weak, but probably it is more correct to say that the nervous control of micturition is not so strong as in the male. The sphincters are usually sufficient for their purpose, however, and normally when a catheter is passed into the bladder it meets with considerable resistance at the upper part of the urethra, and on being pushed in passes into the cavity with a distinct jerk. In cases of diurnal incontinence, on the other hand the catheter literally drops into the bladder as the vesical sphincters are so weak.

Pass a finger into the rectum and note if part of its canal lies within the whole or only part of the prolapsed posterior vaginal wall. A few cases of pure rectocele do occur, but usually the upper part of the swelling contains prolapsed pouch of Douglas and only the lower part, the rectum. The presence of hæmorrhoids, prolapse of the rectal wall or other abnormality affecting the rectum should also be noted during this examination.

Enough has been said to ensure a correct diagnosis of the particular type of prolapse present, and it only remains to mention a few independent lesions having a superficial resemblance to that displacement and also several others which may or may not be associated with it, but are actually responsible for some of the symptoms complained of. A vaginal cyst or a myoma may more or less closely resemble a cystocele, but the passage of a catheter into the bladder will settle the diagnosis.

Bearing down or " something in the passage " may be due to congenital elongation of the cervix without any associated vault prolapse, but in such a case there is no descent of the vaginal fornices on straining.

A swelling in the vaginal canal may also be a fibroid polyp or the fundus in chronic inversion of the uterus, but the fact that these swellings protrude through the cervix and that in the case of inversion the uterine fundus is absent from its normal position can be readily determined by a careful bimanual examination.

Vulvo-vaginitis may sometimes be responsible for a bearing-down sensation which the patient may think is due to prolapse, but the true state of affairs will be apparent on inspection of the vaginal orifice.

Subacute and chronic cystitis may co-exist with genital prolapse and be responsible for some of the urinary symptoms. If this possibility is overlooked the patient will not obtain complete relief from the cure of her prolapse.

Vesical calculi are rarely met with in women, but occasionally they may be found in patients complaining of great difficulty with micturition. True prolapse may also be present in these cases as a result of the straining efforts to pass urine.

TREATMENT

Prevention is better than cure, and, as most cases of prolapse follow definite obstetric injury of the pelvic floor, it ought to be possible to protect this from unnecessary strain during pregnancy, labour, and the involutionary period and so reduce the incidence of this displacement. The following preventive measures suggest themselves :—

During the ante-natal period.—Do not allow the pregnant woman to overtire herself during the later months of pregnancy when the uterus is heavy and the pelvic floor structures softened and congested. Treat constipation by appropriate methods. A mixture containing cascara, belladonna and nux vomica taken regularly three times a day is very useful.

During the intra-natal period.—Discourage the patient from bearing down during the first stage of labour and treat cases of simple delay during this stage with sedatives. Push up the anterior lip of the cervix if nipped by the advancing head. Do not save the perineum at the expense of the important supporting structures about the urethra and bladder neck. Never apply forceps until the cervix is fully dilated. Choose the right time for operative interference, neither too early nor too late. When delivering with forceps be careful to make traction in the direction of the pelvic axis. Carefully repair all lacerations of the perineum and lower part of the vagina.

During the post-natal period.—Prevent uterine retroversion by allowing the patient to move freely about in bed after the first two days of the puerperium and by seeing that the bladder and rectum are emptied regularly. Make a vaginal examination at the end of a fortnight and correct any displacement of the uterus. Make a further examination six weeks after delivery, paying particular attention to the size and position of the uterus and the condition of the pelvic floor. Treat retroversion by replacement and incipient prolapse by the temporary use of a ring pessary for three months. In such cases advise the patient to rest as much as possible until the uterus and pelvic floor structures have returned to normal. It is often forgotten that damaged pelvic supports may recover if given a reasonable chance to do so.

Curative and palliative treatment.—When the displacement has become definitely established, treatment will be either curative or palliative, and, unless definitely contra-indicated, the former is always to be preferred. The only way to cure prolapse is by operation, and the operation of choice is colporrhaphy with or without amputation of the cervix. Abdominal operations are unnecessary as different series of statistics have shown that the vaginal method effects a complete cure in 95 per cent. of cases, which is as much as one can expect from any surgical procedure. Colporrhaphy is essentially an operation for the experienced gynæcologist, as no two cases of prolapse are exactly alike, and the amount of tissue removed and other operative details must be adapted to the needs of the particular patient. The complete operation consists of amputation of the cervix, anterior colporrhaphy, and posterior colpo-perineorrhaphy with, in addition, tightening of the urethra and bladder neck in cases of dislocation of the peri-urethral wedge.

Total hysterectomy is unnecessary as part of the routine treatment of prolapse and, in fact, is harmful, as it removes the keystone of the pelvic floor arch. Occasionally the uterus has to be removed for associated lesions, but in these cases the divided cervical attachments of the fibro-muscular supports must be stitched firmly together in the mid-line and a suitable colporrhaphy performed in addition.

If properly performed, colporrhaphy should not interfere with sexual or reproductive life, but otherwise dyspareunia or dystocia may result from making the vagina too narrow, altering the direction of its entrance, or amputating too much of the cervix. The experienced operator will bear in mind these possibilities and avoid them whenever possible. The operation is not a serious one, but necessitates the patient remaining in bed for two and a-half weeks. She then takes things very easily for another fortnight and abstains from heavy work for a period of three months. Pregnancy should be avoided until a year has elapsed.

This question of pregnancy following colporrhaphy is important, and patients naturally wish to know if they can become pregnant after the operation, if the operation will interfere with labour, and what effect labour will have on the operative result? There is no doubt that any operation involving removal of a considerable part of the cervix will interfere to a certain extent with conception and occasionally be responsible for abortion. Dystocia in a subsequent labour is rare and generally due to cicatrization of the reconstructed cervix or excessive narrowing of the vagina, both of which can be avoided in women likely to become pregnant again. Finally, a woman who has had a colporrhaphy performed is no more and no less likely to develop prolapse than one who has not required such an operation.

Palliative treatment usually consists in the use of some form of pessary, and except as a temporary measure during pregnancy or after labour should only be employed when for medical reasons the patient is considered unfit for any surgical interference. Age, unless extreme, is not a contra-indication, as many women have had a colporrhaphy performed when over

70 years of age and derived much benefit from it. The day of the pessary has now largely disappeared, and very few varieties are to be seen except in the pages of the surgical instrument catalogues. In the treatment of prolapse only two are required, the ordinary rubber watch spring when the patient is able to retain it in position, and the porcelain cup with perineal bands and waist-belt for the others. In some of the very severe cases no pessary is of any use, and then a perineal pad kept firmly in position with a T-bandage may give some relief. The use of pessaries is objectionable from all points of view, and they should only be recommended when surgical treatment is absolutely contra-indicated. They irritate the mucosa of the vagina and cervix, producing foul discharges and perhaps ulceration, and if neglected may lead to fistula formation or predispose to vaginal carcinoma. Patients wearing pessaries should be instructed to douche daily with a weak antiseptic (one drachm of borax to the pint of warm water does quite well) and to have the pessary re-fitted or changed every three months. Prolapse rarely gives rise to trouble during pregnancy, but occasionally the symptoms are aggravated and it is necessary to insert a ring pessary of suitable size to be worn until the end of the fifth month.

Prolapse of the rectum comes within the province of the general surgeon, but I have seen a very extensive one associated with a complete perineal tear and procidentia. This case was treated successfully by the routine method referred to above, together with excision of a triangular area of the anterior rectal wall. Acute prolapse of the urethra sometimes occurs in elderly women. The condition has to be distinguished from a urethral caruncle or carcinoma, but this is usually quite easy, as the urethral opening lies in the centre of the protuberant mass. Treatment consists in excising the prolapsed ring of mucous membrane.

Some Mechanical Aspects of the Pelvis in Clinical Obstetrics and Gynæcology

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THERE is no doubt that the mechanical functions of the female pelvis are becoming of increasing interest to the practitioner in these days of easy transport, lifts and other contrivances invented to reduce the natural exercise of man. The object of this article is to lay stress on the importance of the abdominal and pelvic muscles at special times, during pregnancy, in the puerperium, after abdominal operations, and also of the mobile joints situated around the pelvic girdle, such as those of the lower lumbar and sacral vertebræ and of the sacro-iliac joints themselves.

Low back pain is such a prominent feature to-day that examination of the bony pelvis should not be forgotten when the gynæcologist's investigation is carried out. Quite often a case may be referred to the gynæcological department for an opinion which may simply state after examination "per vaginam all normal," when a chronic sacro-iliac strain following a labour with subinvolution may be entirely missed, and the patient told that the uterus is in good position and everything quite satisfactory. Meanwhile the backache continues and the patient then makes caustic remarks on the skill of the medical profession, especially after she has drifted to an osteopath who, with one or two simple manipulations, has cured her pain.

SACRO-ILIAC JOINTS AND LOWER VERTEBRAL JOINTS

The lower lumbar region and the sacro-iliac joints have long been a veritable gold mine to the osteopathic fraternity. Only recently has the medical profession been taking serious notice of these joints and of the frequent disarrangement of their peace and harmony, as will be evidenced by the very scanty attention devoted to them in even some of the most up-to-date textbooks of orthopædic surgery. J. B. Mennell, in his short, clear book on "Backache,"[1] and more succinctly in an article in these columns,[2] has made the investigation and diagnosis of troubles in this neighbourhood much more simply and clearly understood. So important is the mastery of it that every practitioner should have a simple method of examination of this region at his finger tips.

At the Congress of Obstetrics and Gynæcology, which took place in 1931 at Glasgow, after an introduction by James Young, there was a discussion on the importance of low back pain in gynæcology, where this pain was not referred as due to any visceral disease but was dependent upon an accompanying orthopædic lesion in the lower spine. Readers would be wise to consult the paper of James Young and W. A. Cochrane at this Congress.[3]

It is often more prudent not to operate in order to relieve backache in women, even when gynæcological disorders are present, until the lower lumbar-vertebral joints, and certainly the sacro-iliac, have been put through their full range of movements. Most orthopædic surgeons do this without an anæsthetic, which is a great advantage and is always the method, of course, of the osteopath, who practically never has an anæsthetic given and so can better test the reaction of the patient to the movements of their joints. That there is considerable movement of these joints is evident to any observer who has either dissected them in the female cadaver, or who has scrutinized X-ray photographs of the pelvis during the last weeks of pregnancy, or who has himself carefully examined in various positions a woman's pelvis before labour.

One writer has said that at full term there is two and a half times the degree of movement at the sacroiliac joints that there is in a non-pregnant woman, the range increasing from the fourth month onwards. In cases coming to the post-mortem room at this time the anterior margins of the joints have been able to be separated as much as a quarter of an inch.

One important point is that when we speak of "involution" we often refer to the soft parts only, the uterus, the adnexa and the vagina, but this term should include the pelvic joints and ligaments, which are of great importance. At eight weeks after delivery these are still lax and it usually takes three to four months for them to regain their stability.

For these reasons it has often been found to be unwise to encourage patients to get out of bed and to walk too soon. Frequently this has been practised by obstetricians, on the plea that labour being a physiological process, the patient should resume normal life as soon as possible. These, however, had not reckoned on the advances and attendant difficulties of civilization until the results showed themselves in backache and pelvic discomfort following in the wake of this too rapid activity. A patient may be kept moving as much as possible after delivery in bed, and be encouraged to do exercises and to move her limbs and joints, but she should be given as long a rest in bed as can be spared, so that she then will be fit and strong and free from chances of supervening backache when she assumes the erect attitude. If this condition attains in a normal case, how much more care must be taken when involution is delayed as in some forms of puerperal sepsis when long lasting changes may eventuate from over early activity. At first the patient gets about, then a relapse occurs, then gradually she shows symptoms of disordered functions of the joints, the discomforts of which are at first relieved in the supine position, and then the condition progresses until secondary arthritic changes are produced in the joints.

In delayed involution cases there may be greater freedom of movement at the pelvic joints than in a normal woman at this time; therefore how much more care should be taken where there has been a difficult labour with much moulding of the fœtal head and possible over-stretching of the anterior sacro-iliac ligaments, leading either to traumatic arthritis or even a partial subluxation. Treatment, then, must be on the lines of prevention, and afterwards of a thorough examination and manipulation with the necessary corrective procedures.

This article is only meant briefly to indicate the importance of these cases and to insist on greater collaboration between the gynæcologist and the orthopædist. The importance of these causes of low back pain cannot be over emphasized, and the gynæcologist would be wise to have the experience derived from testing the mobility of these pelvic joints in many cases before he undertakes his operation for vaginal prolapse, uterine displacement and other pelvic conditions. A great deal of work has yet to be done in this field. X-ray examination is often not sufficient in such cases, a thorough physical examination being all important.

THE MUSCLES ATTACHED TO THE FEMALE PELVIS

ABDOMINAL AND PELVIC FLOOR GROUP

The use of the abdominal muscles during pregnancy.—There will always be minor discomforts in pregnancy, but many may be obviated by attention to diet, hygiene and the general management of the pregnancy. Again, many of the mechanical discomforts may be relieved in the early months by abdominal exercises of a simple kind and also by massage. Properly conducted massage and movement can do much to alleviate the night cramps in the legs. In any big series of cases seen through the ante-natal period the medical attendant always finds that those women who are fond of walking, who do not sit about in motor cars, and who are keen on exercise throughout as many of the forty weeks as they can comfortably manage, are the healthiest and give rise to the least anxiety at their labour and during the puerperium. The swelling of the feet that occurs at the end of pregnancy, when not caused by œdema due to cardiac or kidney conditions, is greatly helped by suitable exercise and massage. Finally, the discomfort and real backache which so many get when the ligaments round the sacro-iliac joints soften may be considerably helped by suitable movements and manipulation of those joints. Walking without doubt and the proper use of the abdominal muscles is of enormous help throughout the pregnancy.

After the confinement.—It seems unreasonable that after women have been encouraged during the pregnancy to take plenty of exercise, plenty of walking, to get up and down stairs, in short to use their muscles and joints as much and as freely as they possibly can with comfort, that then they should be left to lie in bed for three weeks. In this way their overstretched abdominal muscles, which are compressed by a useless binder, have no chance of recovery, while they themselves are usually ministered to hand and foot by the nurse who anticipates their every need. Small wonder is it that the bladder and bowel give trouble, that the circulation becomes sluggish and the uterus fails to drain properly, causing various attendant troubles. After three weeks of this enforced muscular lethargy the patient is supposed to get up, and with the abdominal and pelvic muscles in such a weakened state, uterine displacement, enteroptosis, bowel distension and other such troubles often ensue.

Attempts every now and then have been made by enthusiasts who claim that labour is on physiological lines, and who insist that the patient should be made to get up on the third or fourth day. This in civilized countries has been proved to be entirely a mistake, and has been mentioned previously in connection with the involution of the sacro-iliac joints, which does not take place for some time and indicates that the full weight of the body in the erect attitude should not be super-imposed on these important structures.

Results have shown that quite three weeks' rest in bed is advisable especially for city dwellers, though the big maternity hospitals cannot spare their already overcrowded accommodation usually for more than ten, twelve or fourteen days; but with this rest, exercises and movements while in bed are all important.

It is all important that the mother, after forty weeks of pregnancy with its many attendant discomforts, should enjoy to the full the first three weeks of her puerperium, which often should be some of the happiest of her life. Those mothers who have been given and who have performed a graduated series of exercises and movements, bear witness to increased efficiency, greater comfort and well-being, and when they get up they are markedly stronger than their inert sisters. It is not enough just to have a masseuse, however skilled, who does all the work for the patient; this is certainly pleasant and luxurious, but the exercises are the first essential and should start right away from when the patient has had her first good sleep. Only ten minutes to a quarter of an hour need be given up each day, and these movements need not be a drudgery. At first these work through from posture in order to improve drainage of the uterus, to breathing exercises, blowing the abdomen in and out, exercising the leg muscles, contracting the levator ani muscle, tilting up the pelvis and rolling from side to side. In this way, by the end of a fortnight, all the muscles in the body are being exercised by natural movements which aid the organs of excretion and promote involution. Often no harm is done in normal cases in letting the patient use the commode from the second or third day, for which she may be allowed out of bed with the assistance of the nurse. When she gets up about the sixteenth, eighteenth to twenty-first day she should be shown four or five simple exercises for using the abdominal and pelvic muscles and should be encouraged to continue doing these. If, when up, any pain develops in the lower part of the back and the joints are not moving comfortably, it is wise to have a few manipulations done to put these articulations through their full range of movements, after which the patient may return to her ordinary life.

After abdominal operations.—Much the same happens after abdominal operations, previous to which the patient has been leading a normal active life. She then undergoes abdominal section, and is kept in bed and has everything done for her for three weeks. Is it at all surprising that her organs do not function smoothly? Many surgeons are familiar with the type of patient that gives post-operative anxiety, has the worst distension, the most pain and nausea, the most trouble with her bowel and bladder, and possibly later tends to thrombosis and, perhaps, embolism. Quite often it is the nervous patient who is terrified of moving hand or limb, who is propped up in the Fowler position with the knees well flexed on the abdomen and rings her bell for the nurse day and night.

Patients, after an abdominal operation in order to avoid these troubles, should have a progressive series of movements and exercises mapped out for them day by day. It is not enough to say you wish them to keep moving their arms and legs; instructions should be written down or typed out in detail, and should be of the simplest kind. If this is done and a masseuse can be afforded, these patients are much stronger when they get up. Their organs then function more normally and are maintained in better position. In these difficult days expenses have to be cut down in every direction, so only the fortunate few can afford massage after operations and confinements, but all can easily follow a simple programme of movements and exercises, so that when they face the world once more, the skeletal system of bones, joints and muscles is better able to cope with the strain of modern life.

The question is who should demonstrate these exercises? Does it mean the nurse or midwife or a special instructress? Only for those few who can afford it, as the nurse has quite enough to do as it is, and the mother should make no further claims upon her. The simple table of movements and exercises should be handed to the mother to carry out herself. It is often the fault of so many methods of exercises and their demonstrators that too complicated movements are given. The proof of their failure is that as soon as the teacher's back is turned, nothing more is done, whereas if five or six simple exercises are thoroughly explained, there is a chance that these may be persisted in for some time to come with considerable benefit to the patient.

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The Early Diagnosis and Treatment of Pregnancy Toxæmia

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THE toxæmias of pregnancy may be divided into two main groups: (1) comprising albuminuric toxæmia, pre-eclampsia, and eclampsia; and (2) hyperemesis. The term albuminuric toxæmia draws attention to the fact that in this type the chief damage in early cases is renal; but the stress laid on the urinary abnormality has led to the neglect of other signs and symptoms, which sometimes enable toxæmia to be diagnosed before albuminuria has occurred, and which are of more assistance in estimating progress and prognosis. In both eclampsia and toxic hyperemesis degenerative changes are found in the liver, and the changes found differ in the two diseases. Albuminuric toxæmia may progress through pre-eclampsia to eclampsia, further stages of the same disease. Hyperemesis appears to be a distinct entity.

ALBUMINURIC TOXÆMIA

This is generally considered to occur in from 3 to 5 per cent. of women who were apparently normal before pregnancy; and one of the important objects of ante-natal care is its early detection and treatment. The dangers of this pregnancy toxæmia can be grouped under three headings: (1) eclampsia; (2) permanent renal damage; (3) death of the fœtus. From these we can select the mortality from eclampsia as a test by which to measure the ante-natal work which is being done throughout the country. Examination of the

Registrar General's reports shows that the death-rate, per 1,000 births, from "puerperal albuminuria and convulsions" has not decreased; in the last ten years the mortality has, in fact, slightly increased. Since there has been a great increase in the number of ante-natal clinics, and the amount of ante-natal care, in the same period, it is evident that toxæmia is not being diagnosed early enough to prevent eclampsia.

The Maternal Mortality Committee in its interim report expressed the opinion that: "Apart from the cases of fulminating eclampsia which may occasionally occur either before or after delivery within a short time after a normal blood pressure reading and urine test, eclampsia is almost entirely a preventable disease." I have examined the case sheets of eighteen recent cases of eclampsia in order to find out how many could have been prevented. The series consists of consecutive cases admitted to hospital at the request of a general practitioner or from the hospital maternity district. In eight cases symptoms of toxæmia began one month or more, and in seven cases one or two weeks before the onset of fits. In three cases the onset was rapid and the patient was probably normal two or three days before the fits occurred. There was no case of true fulminating eclampsia of the type referred to by the Maternal Mortality Committee. Fifteen of the patients could have been diagnosed as toxæmic, by efficient ante-natal supervision. In the other three cases eclampsia might possibly have been prevented if the patient had come for examination when she began to feel ill, and if immediate treatment had been undertaken.

Symptoms of toxæmia.—These may be divided into two groups: (1) early symptoms of mild toxæmia, increasing very gradually in severity; (2) pre-eclamptic symptoms, the onset of which precedes the fits by only a few hours, or at most a few days. In order to prevent eclampsia the toxæmia must be detected in the first stage, in the second stage it may not be possible to start treatment soon enough, unless the patient is already in hospital. The first stage of the toxæmia is also important from the point of view of prevention of chronic nephritis and intra-uterine death of the fœtus. A prolonged toxæmia is more likely to produce permanent renal damage than is eclampsia of very rapid onset; and the fœtus may be killed by a toxæmia in which the mother was never threatened with eclampsia.

Œdema is the most important early symptom. In cases of severe toxæmia it is common to find that there is a long history of œdema preceding the more severe symptoms which finally drew attention to the disease. Among the eighteen cases mentioned above I find that œdema was present at the onset of symptoms in thirteen, and preceded all other symptoms in nine of these. It is absent only when the onset of toxæmia is rapid. The œdema probably starts in the feet and legs and is then too often regarded as almost physiological, due to pressure by the enlarging uterus. Definite œdema of the legs, in spite of its apparent postural origin, may be due to toxæmia, and the patient should be seen frequently, and a careful watch should be kept for albuminuria and rise of blood pressure. Generalized œdema, shown by swelling of the face and hands, is a more definite sign of toxæmia. It is important even when only of slight degree, and is usually a symptom complained of by the patient, rather than a sign noticed by the practitioner. The most important type of œdema is that which gradually spreads up the thighs and on to the abdominal wall; at the same time slight swelling will usually be noticed in the hands and face. This spreading œdema is a common sign of the pre-eclamptic state. I have noticed it especially in toxæmic patients during labour. Such patients require careful treatment to prevent intra-partum and post-partum eclampsia.

Headache is a later symptom. If it is due to toxæmia it does not precede the development of albuminuria and the rise of blood pressure by more than about two weeks as a rule. Patients who have had headaches longer than this usually admit, when carefully questioned, that they have had them throughout pregnancy or longer, and the headache can then be classed as migrainous. *Visual disturbances* are also a late sign. I do not find "spots in front of the eyes" or "flashes of light" of much value as a sign of mild toxæmia, but disturbances of vision are very important in pre-eclampsia. Partial or complete blindness very commonly comes on an hour or two before the first fit, and calls for immediate drastic treatment of the toxæmia, if eclampsia is to be prevented. The rapid onset of severe headache has a similar significance, and epigastric pain, in conjunction with other symptoms or signs, often precedes convulsions.

Physical signs of toxæmia.—Œdema has been included among symptoms because it begins gradually and, especially on the face and hands, may be more obvious to the patient than to the practitioner. There is no doubt that *rise of blood pressure* is the most important sign of toxæmia. Attention has recently been drawn to its importance by Professor F. J. Browne. He found that rise in blood pressure preceded albuminuria in 13 cases out of 48, by periods ranging from 11 to 89 days. In the other 35 patients albuminuria and rise of blood pressure were discovered at the same time. Routine blood pressure estimations should be made at intervals throughout pregnancy and the results interpreted in relation to the symptoms and other signs. Browne recommended that the patient should be seen every month till the thirtieth week, then fortnightly till the thirty-sixth week, and weekly after that till delivery. This may seem too much to ask, but it is only by routine examination in all cases that we can hope to detect early toxæmia. If the blood pressure cannot be taken as a routine, it should at least be taken when there are any symptoms which may be toxæmic; and if albuminuria is present, the degree of rise in blood pressure gives a valuable indication of the severity of the disease.

Any rise in blood pressure over 140 mm. Hg should be regarded as probably toxæmic in origin. In patients of 35 years of age or more such a blood pressure may be normal, but this can be decided only by correlation with the other signs and symptoms, and by seeing the patient weekly for a time, if no indication is found for urgent treatment. A rise of blood pressure to 160 mm. Hg or more, especially if it has occurred in a short time, is an urgent indication for treatment.

Albuminuria occasionally occurs as the first sign; but this is very uncommon in a true pregnancy toxæmia. It is more likely to occur early in chronic nephritis, and may then of course have been present before pregnancy. In pre-eclampsia the amount of albumen in the urine rapidly increases.

It must be emphasized that all symptoms and signs must be taken into account in deciding whether toxæmia is present, and what treatment shall be given. A slight rise of blood pressure combined with moderate œdema and headache, or one of these and slight albuminuria, is of much more significance than a symptomless rise of blood pressure of greater degree. A patient is sometimes found to have a blood pressure of 160 mm. Hg or more, and may go through pregnancy and labour successfully, never showing any other abnormality. She must then be regarded as a case of hyperpiesis with no toxæmia or nephritis. On the other hand, a patient may have eclamptic fits with a blood pressure of only 155 mm. Hg. A single symptom or sign occurring alone is an indication for investigation and observation, but does not usually require much treatment.

Ante-partum hæmorrhage is an occasional consequence of toxæmia, and may be included among the symptoms and signs. It is usually associated with extensive placental infarction which ultimately causes the death of the fœtus. It has been noted in eclampsia—but as a rule a toxæmia which leads to ante-partum hæmorrhage does not cause eclampsia.

Chronic nephritis is sometimes included in a discussion of pregnancy toxæmia. Definite nephritis with cardio-vascular changes and signs of renal deficiency, which were known to be present before pregnancy, is an indication for immediate termination of pregnancy. Recurrent toxæmia may possibly be due to a slight degree of renal damage which only shows under the strain of pregnancy. This can only be proved by continued observation after pregnancy has terminated; slight degrees of nephritis are difficult to diagnose during pregnancy, and doubtful cases should be treated as pregnancy toxæmia.

Treatment.—The origin and nature of the toxin responsible for this disease are unknown. We can terminate the toxæmia by terminating the pregnancy, but there is usually no abnormality in the ovum which can be regarded as a cause of toxæmia. There is very little evidence in favour of alimentary toxæmia as a primary cause, and it is difficult to believe that a condition peculiar to pregnancy can be due to alimentary disturbance. We know, however, that in early cases the main damage done by the toxin is renal. Treatment must therefore endeavour to diminish the work done by the kidney, in order to give it every chance to deal with the toxin; and pregnancy must be terminated before the kidney suffers permanent damage, and before the toxin has killed the fœtus, or injured the liver.

Rest in bed is the most important part of all methods of treatment. A mild toxæmia may clear up with complete rest in bed, and very little treatment beyond that. More severe toxæmias usually show a temporary improvement only. Chronic nephritis may develop after mild toxæmia, or the mild toxæmia may develop into severe toxæmia which can only be terminated by emptying the uterus. All mild cases must therefore be treated by complete rest at a time when treatment has its greatest effect. The patient must stay in bed till the signs of toxæmia disappear, and the blood pressure and urine are normal. This does not commonly occur before delivery, except when treatment is undertaken in the very early stages; therefore, most patients with definite toxæmia of pregnancy must stay in bed till delivery.

Diet is usually considered to be of equal importance with rest, but it is difficult to be certain whether it has such a great effect on the progress of the patient. The diet may be restricted (1) to give rest to the kidney, (2) to prevent the production of a hypothetical toxin in the alimentary canal, (3) to decrease the production of acid, and increase the production of alkaline substances in the body, (4) to decrease the ingestion of salts. The first reason is definitely founded on the fact that the kidney suffers first and most severely in toxæmias which do not progress as far as eclampsia. The second reason is theoretical, but a diet which satisfies the first reason will also probably eliminate the foods supposed to produce the toxin. The third reason depends on the researches of Osman and Close who found that an alkali-producing diet and administration of large quantities of alkalis produced improvement in cases of albuminuric toxæmia of pregnancy; similar treatment having already been found to decrease the incidence of nephritis in scarlet fever. Both types of diet are essentially low-protein diets. The patient should not take meat, fish, eggs, or meat extracts. Bread, and cereals generally, should be taken sparingly. She may have two pints of milk daily, with milk puddings and potatoes. Fruit, stewed or raw, and salads may be taken, and are beneficial because they increase the volume of the food. The patient should be encouraged to drink large quantities of fluids, water, lemonade, or barley water. Lemonade made with glucose is the best drink, because its calorie value is high. If the diet is kept too low she may be living on her own tissues. Cocoa and weak coffee or tea may be taken in small quantity, and the total amount of fluid should be 4 or 5 pints daily. Sugar also tends to counteract the acidosis which is a danger whenever diet is restricted.

It may not be found possible to keep a patient on such a low diet for longer than about ten days. If improvement takes place, a small amount of fish and an egg may be added; but meat must be avoided for the rest of pregnancy even if the toxæmia clears up completely.

Elimination of the toxin is the theoretical object of some forms of treatment. Whether it achieves this object or not, diuresis is to be encouraged by the administration to large amounts of fluid, because it certainly appears to lead to improvement, and to diminution of the toxæmia. Diaphoresis may be encouraged by hot-water bottles and blankets, but it is doubtful whether any good results from increased sweating. The patient should, however, be kept warm; and in the more severe toxæmias it is better that she should lie between blankets. Purgatives should also be given, in order to produce one or two motions daily. Magnesium or sodium sulphate in doses of one to three drachms daily are the most satisfactory.

Drugs are of very little use in treatment. Alkalis may be given, as in Osman and Close's treatment of nephritis. Potassium citrate and sodium bicarbonate are given two or four hourly, in doses up to a total of 400 grains daily or sometimes more, the object being to keep the urine continually alkaline. If this treatment is to be any good it requires frequent determinations of the exact degree of alkalinity of the urine. In favourable cases diuresis takes place and toxæmia diminishes, but it is too soon to give any final opinion on this treatment.

In the presence of more severe toxæmia, as shown by a blood pressure of 160 mm. Hg or over, and symptoms of pre-eclampsia, the treatment must be more drastic than that which has just been described. No solid food should be given by the mouth, but glucose lemonade and barley water should be taken freely. If the blood pressure rises and symptoms increase in severity the pregnancy must be terminated at once.

Duration of conservative treatment.—It is now generally accepted that albuminuric toxæmia is likely to lead to permanent renal damage if it is allowed to continue longer than about two weeks. This period is a reasonable test of the treatment, and pregnancy should be terminated if the patient shows no improvement at the end of that time. If improvement is occurring the period of conservative treatment may be extended if the fœtus is small, but there is little to be gained by prolonged dietetic treatment when the pregnancy has reached 36 weeks. During treatment a careful watch must be kept for increase of headache, visual disturbances, and œdema; and the blood pressure must be taken twice daily, because it is the safest guide to the patient's condition. A blood pressure remaining at 160 mm. Hg or over, in spite of treatment for three or four days, and a blood pressure rising above this level in spite of treatment, are indications for immediate termination of pregnancy. Patients with persistent symptomless high-tension, and no albuminuria, must be carefully distinguished from those where the rise of blood pressure is due to toxæmia. In the presence of severe toxæmia delay is of no advantage to the fœtus, which is more likely to die in utero from toxæmia than after birth from prematurity.

Termination of pregnancy.—The two methods most commonly used are bougie induction, and rupture of the membranes. If labour does not come on castor oil may be given, and an enema, as in an ordinary drug induction, and supplemented by hourly injections of pitocin in two-unit doses up to a total of ten units. When pains come on it is dangerous to continue giving pitocin. Pituitrin should not be used because it raises the blood pressure. Drug induction without previous instrumental induction is useless unless the patient is at or near term, when it may be tried before resorting to bougie induction. The fœtal mortality during labour is high because the placenta often contains infarcts before labour, and the fœtus dies of asphyxia before delivery. Cæsarean section may therefore be considered when the mother is elderly, and when a previous fœtus has been lost from toxæmia and the mother has no living child. If chronic nephritis is diagnosed Cæsarean section is the best method because sterilization is indicated. In pregnancy toxæmia there is no indication for sterilization.

Following delivery the patient should be advised not to become pregnant for at least two years, in order that the kidney may have opportunity for complete recovery. There will then be less likelihood of a recurrent toxæmia, and renal function tests can be performed to exclude the possibility of nephritis, before the next pregnancy.

HYPEREMESIS GRAVIDARUM

This is a rare disease compared with the albuminuric toxæmia which has been dealt with in preceding pages. It is commonly divided into neurotic and toxic types, but it seems probable that the one really develops into the other; and it is possible that the "normal" early morning vomiting of pregnancy may be toxic in origin. True toxic hyperemesis is a very serious and fatal condition, in which termination of the pregnancy is nearly always necessary. Its progress is so insidious that the decision to empty the uterus may not be made early enough to save the patient's life. It usually occurs between the second and fifth months of pregnancy, and begins with morning vomiting, which gradually becomes more severe till the patient cannot keep any food down. The first definite indication that the condition is toxic will be failure of nutrition—the patient becomes thinner. At the same time there is a diminution in the output of urine; this is the first evidence of dehydration. The vomiting may not appear severe, but the condition of the patient gradually deteriorates. Her complexion alters and jaundice appears; bile may be found in the urine. In the last stages of the disease the pulse rate rises, and albumen is found in the urine. The blood pressure is usually low throughout.

The patient should be treated by isolation and starvation to a degree which depends on the severity of the disease. In definitely toxic cases it is necessary to stop all feeding by the mouth, and give enemata, or continuous rectal saline, containing 5 per cent. glucose. Glucose solution may also be given intravenously. Bromides may be added to the enemata. After twenty-four to forty-eight hours a little water may be given by the mouth, and the patient may eat small portions of lettuce or fruit. The output of urine, the intake of fluids, and the amount vomited must be measured daily. If the urinary output remains small, and the clinical condition of the patient does not improve, therapeutic abortion must be carried out, even if very little vomiting is occurring. The most useful signs of toxæmia are diminished output of urine, the presence of bile in the urine, and jaundice. Albuminuria often occurs too late to be of any value in diagnosis. Abdominal hysterotomy is the best method by which to terminate pregnancy; induction is too slow, and vaginal hysterotomy may cause profuse bleeding and shock. If pregnancy is terminated too late, the toxæmia may continue, and the patient may die a week or more after the uterus has been emptied.

The Management of Cases of Abortion

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ABORTION is one of the most important of the common emergencies of general practice and few medical men have been fortunate enough to escape anxieties about these cases. Most patients with abortion are treated by the general practitioner who, for the successful management of the average case, depends upon his skill in diagnosis, his judgment and the therapeutic measures under his control. If treatment is to be satisfactory, some of the complications of abortion demand early recognition, and when these occur, for example septic abortion, the practitioner's responsibilities are heavy. The object of this communication is to direct attention to some of the important clinical problems arising in the management of cases of abortion. It is not intended to discuss here the question of the causation of abortion in detail, as it is my experience that erroneous impressions are frequently obtained from women who are determined to conceal the criminal nature of their case. Repeated abortion belongs to a different category, for it often leads to extreme unhappiness.

Repeated abortion.—Such cases are not uncommon and, in some, the cause can be recognized and rectified. It is important to remember that syphilis causes abortion after the 20th week of pregnancy; and that repeated abortion in early pregnancy is not due to syphilis. Congenital retroflexion of the uterus and small fibroids, which are sometimes responsible, are easily dealt with by operation. One of the commonest causes is ill-development of the uterus and the associated syndrome of hypoplasia genitalis; the late onset of puberty, irregular, scanty and painful menstruation, taken in conjunction with a palpably small uterus lead to the diagnosis. Such patients frequently abort three or four times and then go to term with subsequent pregnancies. Simple dilatation of the cervix often helps these patients and, in a fair percentage of cases, the ensuing pregnancy proceeds to term: the method is far from being a certain cure, but it should always be employed in cases of this type. On theoretical grounds the administration of ovarian extracts, such as progynon, menformon, theelin and sistomensin should be recommended prior to pregnancy and active corpus luteum extracts or the prolan preparations during the early weeks of pregnancy. Many gynæcologists have claimed good results from organotherapy of this kind, but in my hands the results have been disappointing, and it is clear that further work is required before therapy along these lines can confidently be recommended.

In another group of cases repeated miscarriage follows a difficult instrumental delivery during which the cervix and perhaps also the lower uterine segment have been lacerated. Repair of the cervix is indicated in cases of this group. Similarly, curettage should always be advised in those cases which follow labours complicated by morbidly adherent placenta or subsequent puerperal sepsis. Rare causes of repeated miscarriage are the congenital split pelvis and spina bifida occulta.

In a fair proportion of cases no cause for the repeated miscarriage can be found: nevertheless, dilatation of the cervix should be recommended. Though admittedly empirical, the treatment is sometimes successful and success means a great deal to patients of this type. Medical men are often asked to give a prognosis in cases of repeated miscarriage. It is extremely rare to see patients of menopausal age whose pregnancies have all terminated in miscarriage; consequently there are not any grounds for too gloomy a prognosis except in the very rare unfavourable cases of split pelvis and spina bifida occulta.

Threatened abortion.—In all cases of abortion much depends upon accurate diagnosis; indeed, without very great precision in diagnosis it is rash to give a prognosis, and treatment approaches empiricism. In cases of suspected threatened abortion it is first necessary to establish the presence of intra-uterine pregnancy. The most dangerous mistake to make is to confuse ectopic gestation with threatened abortion, and it is my experience that this error is made much more frequently than is generally believed. With ectopic gestation violent abdominal pain is the main symptom; it is true that in cases of tubal mole the pain is intermittent and colicky, but even then it is much more severe than the pain of threatened abortion. Again, in ectopic gestation the vaginal hæmorrhage when present is slight in amount, often of the nature of a coagulated brown discharge; the passage of bright red blood or of clots is very much contrary to the usual findings of ectopic gestation. It is, again, not uncommon for the decidual cast of ectopic gestation cases to be mistaken for an ovum or placenta. A decidual cast is never infiltrated with blood or clot; it is white and thick, with a smooth inner surface. In all cases the material passed must be examined carefully; the presence of a fœtus in the discharge proves the pregnancy to have been uterine.

The pelvic physical signs of threatened abortion are those of intra-uterine pregnancy combined with vaginal hæmorrhage. Dilatation of the cervix is hardly ever found in cases of threatened abortion; when present, it suggests that the abortion is becoming inevitable. Care must be taken to distinguish between the multiparous cervix and a cervix which is dilating during the evacuation of the uterus.

Vaginal hæmorrhage in early uterine pregnancy may be caused by mucous polypus of the cervix and by vascular erosions. In such cases the bleeding often follows coitus. Carcinoma of the cervix is rarely seen in early pregnancy; it is characterized by severe bleeding on vaginal examination. All these three causes can be diagnosed with precision only by speculum examination of the cervix. The importance of speculum examination of the cervix in cases of suspected threatened abortion cannot be overstated.

Few advances have been made in the *treatment* of threatened abortion. Absolute rest in bed is essential; purging is contra-indicated. Sedatives should be freely administered; personally, I use small doses of morphia or omnopon. The use of corpus luteum extracts has been advocated by some authorities; it should be remembered that few marketed preparations of the corpus luteum have a demonstrable pharmacological effect when given by mouth, and, personally, I have had no success with this method of treatment. Small doses of ergot, e.g. minims 3 of ernutin given three times a day have seemed to me to be helpful. The theoretical reason for this treatment is perhaps open to severe criticism, for it supposes that mild contractions of the uterus are induced, which are sufficient to control hæmorrhage, but insufficient to cause strong contractions of the uterus. It is difficult to assess how much such measures help in these cases, for the symptoms of threatened abortion often subside as the result of simple rest in bed and the administration of morphia.

Vaginal hæmorrhage at the times of the suppressed periods develops fairly frequently in early pregnancy and is usually regarded as a sign of threatened abortion. There is no method of distinguishing between the two conditions, and for this reason it is customary in cases of habitual abortion to keep the patient in bed at the times of the suppressed periods.

Missed abortion.—The term "missed abortion" is used somewhat loosely at the present day. In cases of missed abortion the ovum dies early in pregnancy, usually about the 10th week, and instead of being expelled, remains adherent to the wall of the uterus. Slight hæmorrhage occurs at the time of the death of the ovum, the bleeding then stops and a long period of amenorrhœa follows, during which the uterus does not enlarge and the symptoms of pregnancy subside. The period of amenorrhœa may last a long time—as much as two years—then a brown discharge develops, and finally a carneous mole is passed. The important point is that the uterus always empties itself spontaneously in due course. Missed abortion is a rare complication of pregnancy. At St. Bartholomew's Hospital we have a large number of abortion cases, but missed abortion cases form only about 1 per cent. of the abortion admissions.

The diagnosis of missed abortion is simple if the classical history is obtained. A number of cases may present difficulty. For example, a complete abortion may have followed the initial hæmorrhage and the patient becoming pregnant again, the uterus is found enlarged. Again, the subinvoluted multiparous uterus may give rise to difficulty, but in such cases amenorrhœa is very exceptional.

In cases of missed abortion the patient usually insists upon evacuation of the uterus. The only exception I can recall was with a sophisticated woman who thought missed abortion seemed a very satisfactory method of birth control! The simplest method of evacuation is to insert three or four laminaria tents into the cervical canal; abortion usually follows within 36 hours.

An alternative method is to insert a small hydrostatic bag into the lower uterine segment after preliminary dilatation. Both methods are to be preferred to immediate evacuation, for with them the complications, shock and hæmorrhage, are rare. Tents are sterilized by dry heat and are now used more often than a few years ago.

Inevitable abortion.—With this the severity of the bleeding, the dilatation of the cervix, and the presence of some part of the ovum within reach of the examining finger placed either in the vagina or in the cervical canal, allow the diagnosis to be made without difficulty. The majority of cases of abortion terminate spontaneously without complication and the cardinal rule of treatment of abortion cases is not to interfere unless there are well-defined indications to do so. These indications are: (1) Hæmorrhage, (2) sepsis, and, very rarely, (3) the development of chorion-epithelioma.

Hœmorrhage is the commonest complication. It may assume one of three clinical forms: (*a*) Hæmorrhage during the passage of the ovum; (*b*) hæmorrhage due to retained products; (*c*) uterine hæmorrhage following complete evacuation of the uterus.

(*a*) Severe bleeding may accompany the passage of the ovum and very rapidly the woman may be reduced to a desperate state of anæmia. It is this type of case which causes the practitioner the greatest anxiety, for he has to decide whether the uterus must be emptied by operation and, more important still, he must decide whether the anæmia and shock are of a degree to contra-indicate this measure. In spite of the relative frequency with which such cases are seen the mortality from hæmorrhage is very small. In the last eight years we have had approximately 500 abortion cases at St. Bartholomew's Hospital, but there has been no death from hæmorrhage. There are two points to grasp: the first is that the hæmorrhage is usually spontaneously controlled in cases of this type; the second is that if a woman is anæsthetized when in this state of shock and the uterus perhaps rather vigorously evacuated, then fatalities may occur. In most cases the hæmorrhage is controlled by the administration of pituitrin and further interference is unnecessary. If the hæmorrhage persists and it is decided to empty the uterus, the correct procedure in cases in which the bleeding has been severe is first to transfuse the patient and then to perform evacuation. To attempt this measure prior to transfusion when the woman is shocked and anæmic should be regarded as a serious error of judgment. If transfusion is not possible it is safer to treat shock with warmth and fluids and to induce uterine contractions with pituitrin.

(*b*) Hæmorrhage due to retained products of conception. This complication is frequently seen and it gives rise to persistent bleeding which may be prolonged for as long as three or four weeks. Usually either part or the whole of the placenta is retained and often a clear history is given of the passage of the embryo alone. In most cases the physical signs are simple; the cervix is dilated to admit one or two fingers and the retained products of conception lie within reach of the examining finger. The bleeding is usually profuse, the uterus is soft and enlarged, and its shape is globular with a marked increase in its antero-posterior diameter.

The treatment of cases of this type consists in evacuation of the uterus. Personally, I prefer to treat these patients conservatively with pituitrin for 24 hours if institutional facilities are available. Intramuscular injections of 10 units are given four-hourly to a maximum of six doses, and in a large percentage of cases spontaneous evacuation of the uterus follows. The reason for this conservative treatment is that cases are seen from time to time in which latent sepsis has been lighted up by digital evacuation of the uterus and fatal septicæmia has followed. The method is not advised if the woman is in her own home, and clearly in cases of severe hæmorrhage preliminary transfusion followed by evacuation is the correct procedure. There are some important points to be remembered in the technique of evacuation of the uterus for retained products. The cervix must be dilated to admit the passage of one finger into the cavity of the body of the uterus and then either the whole hand or half hand is placed in the vagina. Pressure with the external hand on the fundus through the abdominal wall brings this part of the uterus within reach. The index finger is swept round the wall of the uterus and detaches the retained products from the placental site. Unless the hand or half hand is placed in the vagina it is quite impossible for the finger to reach the fundus of the uterus and detachment may be incomplete. Ovum forceps are now passed into the uterus and the pieces of placenta, which are now lying free, are removed without any risk of injuring the wall of the uterus. A finger passed into the uterus ensures that all the ovum has been removed. It is important to remember that the placental site is rough and shaggy and projects forwards into the cavity. It may be mistaken for adherent placenta and much harm may be done by scraping away pieces of the placental site. An intrauterine douche containing 1 dram of tinct. iodi to the pint at a temperature of 105° F. is now given. Higher temperatures should be avoided except in cases of severe hæmorrhage, for a hot douche injures the decidua and diminishes its resistance to infection. The douche nozzle must be two-way and the douche can should not be raised more than one foot above the level of the patient. From time to time I see cases with the signs of mild pelvic peritonitis following upon vigorous douching after evacuation of the uterus. Experience with lipiodol injections in determining the patency of the Fallopian tubes has shown how easily fluid passes from the uterus into the peritoneal cavity.

The two common complications of evacuation of the uterus are hæmorrhage and sepsis: splitting of the cervix from rapid dilatation and perforation of the uterus with a curette are gross errors of technique. Very commonly smart hæmorrhage follows evacuation of the uterus: it is controlled by the injection of pituitrin, by the use of a hot douche at a temperature of 115° F.: if these methods fail, the uterus should be plugged with sterile gauze. Sepsis is a fairly frequent sequel of evacuation of the uterus. A rigor often follows the removal of retained products, and mild pyrexia for a few days is common. Occasionally, fatal septicæmia follows the removal of retained products in spite of absence of temperature or evidence of infection prior to the operation.

(*c*) Persistent hæmorrhage following abortion. Cases of this type are frequently seen and they present one of the most difficult problems with which the practitioner has to deal. It must be emphasized that the first menstrual period after a miscarriage is almost invariably excessive and sometimes the bleeding is very severe. One frequently sees such cases and often the practitioner is inclined to advise curetting to remove retained products. If there has been an interval since the abortion during which no bleeding has occurred it is almost certain that no retained products remain. Persistent hæmorrhage since the abortion is the essential symptom of retained products. The excessive menstrual period is controlled by rest in bed and the administration of active preparations of ergot.

Apart from these cases there is another group in which persistent uterine bleeding follows abortion, although there is no clinical evidence of retained products. Similar cases are seen after normal delivery and are more frequent if the infant is not breast fed. The bleeding may be continued for several weeks;

usually the daily loss of blood is not excessive and the patients are able to continue their daily work. The cause of hæmorrhage of this kind is imperfectly understood; in the past, it has been ascribed to subinvolution or to a mild endometritis. My own view is that it is comparable to that of metropathia hæmorrhagica, for not infrequently a cystic ovary is palpatable and the endometrium shows necrotic areas.

Clinically the cases must be distinguished from cases of retained products and of chorion-epithelioma. In the typical case of retained products the bleeding is severe, the uterus is soft and bulky and commonly the cervix is dilated. Chorion-epithelioma is a very rare sequel of abortion; it causes severe vaginal bleeding, and one of the earliest signs of its development may be the growth of purple nodules in the lower part of the vaginal wall. In practice, cases of persistent bleeding following abortion are most often regarded as due to retained products and the uterus is curetted. The difficulty is that the type of case I have indicated above does not usually respond to this treatment. Nevertheless there is much to be said for curetting these cases; it establishes the diagnosis and allows chorion-epithelioma to be excluded.

Septic abortion.—Fatal cases of abortion almost always come under this heading. Septic abortion is seen very frequently and in most cases is the result of criminal abortion. Pathologically, septic abortion does not differ essentially from puerperal sepsis and cases can similarly be grouped into the divisions of endometritis, septicæmia, salpingitis, thrombo-phlebitis, pyæmia, peritonitis and parametritis. In septic abortion certain groups are seen more frequently than with puerperal sepsis. Fulminating cases of peritonitis are not uncommon and salpingitis cases are seen very frequently.

In practice there are certain common clinical examples which present difficulty in treatment. One of the most frequent is the case of retained products with high temperature and offensive discharge. The diagnosis of infection and retained products is easily made, but it is by no means easy to decide whether the uterus should be evacuated at once. It is undoubtedly true that this measure is followed by excellent results in most cases, but it suffers from the drawback that the infection may be lighted up and in some cases a fatal septicæmia follows. In Germany and America the tendency at the present day is to treat septic cases of this type expectantly; in most cases the temperature falls within a few days and evacuation is carried out four days after the temperature has fallen to normal. In this way the mortality of cases of this type has been greatly reduced. My own experience is that this expectant method suffers from the disadvantage that salpingitis and tubo-ovarian abscess develop more frequently than after immediate evacuation. On the other hand, in frankly septic cases a lower mortality is obtained with the expectant method. Each case must be treated on its merits. If there is no evidence of criminal abortion by instruments or injections, immediate evacuation gives the best results; in cases of severe sepsis the expectant method is to be recommended.

Another example of septic abortion is the case complicated by peritonitis. Peritonitis may develop either before or after evacuation of the uterus: in both cases the prognosis is grave and few patients survive. Simple laparotomy with drainage gives poor results except in those cases in which injected fluid has passed through the Fallopian tubes into the peritoneal cavity. Peritonitis, resulting from an infected uterus, is almost invariably spreading in type: localization in the pelvis is rare. Hysterectomy is the only procedure which offers any hope of success, but the operation must be performed early; it is useless to remove the uterus from a woman with generalized septicæmia or from one who is in the last stages of a generalized peritonitis. Much depends upon the early diagnosis of peritonitis; a delay of a few hours may alter the prognosis completely. The diagnosis is often extremely difficult even when great experience is at hand. There are two main difficulties; the first is that patients with septic abortions often have abdominal tenderness and rigidity during the abortion and these signs disappear after the ovum has come away. The second is with cases of tubo-ovarian infection when abdominal signs may be detected. These latter cases arise some days after the abortion and can usually be diagnosed by expert pelvic examination. With other types of infected abortion, treatment is along the same lines as that of puerperal sepsis.

In conclusion, I would emphasize the permanent damage which may result from complicated abortion. Salpingitis and pelvic adhesions with their attendant symptoms of backache, dysmenorrhœa, and sterility, can frequently be attributed to septic abortion. Abortion cases demand skilled and careful attention and should not be lightly dismissed by the practitioner.

The Treatment of Drug Addiction: A Review

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Part II*

RAPID WITHDRAWAL METHODS

QUITE arbitrarily, we shall regard as rapid withdrawal a period of not more than 14 days from the commencement of the treatment to the final dose of the narcotic. We shall also classify the different procedures into convenient sub-groups and deal first with the newer methods or those presenting special points of interest. There is some controversy as to the originator of the rapid withdrawal plan. Mattison[36] claims the honour and states that he described it in 1876. A method of this kind was, however, used in some cases by Levenstein,[4] and Erlenmeyer claims to have remodelled it and made it his own. His withdrawal period was 8–14 days.[37]

(*a*) *Rapid withdrawal with injections of autogenous serum.*—Modinos[29] has recently described a method which has some interesting points. The procedure is very simple and consists in the injection under the patient's skin of serum resulting from the previous application of a blister. The serum is removed from the bleb with a moderately thick needle and immediately re-injected subcutaneously. As great claims have been made for this plan, a few lines of more detailed description of it, as modified by Sioe and Hong[38] (who have treated 90 cases by it), may be worth while.

They use the cantharides cerate plaster of the Dutch Pharmacopœia cut to a size of 8 sq. cm. and 1 mm. thick and aim at obtaining from 2–8 c.cm. of serum. This blister is applied to the patient's chest or abdomen and, after about 16 hours, they draw off the blister fluid and inject it in the upper part of the arm or leg, though the actual site does not matter much. The procedure is repeated on the third or fourth day, and a third injection is given about four to six days after the second. The morphine (or heroin) is rapidly tapered off and can usually be withdrawn completely in seven days, in some cases as early as three days. Modinos holds that antibodies are formed, but in accordance with the best authorities, Sioe and Hong reject this theory, and hold that an acute hypersensibility is produced to the addiction drug, and that this creates in the addict a distaste for the drug.

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A still later observer, Dr. Noordhoek Hegt, has critically studied the method and tested it against control patients treated by other methods.[39] He obtained good results, in so far as actual withdrawal of the drug was concerned, but did not find the results superior to those obtained by ordinary procedures. He regards the " hypersensibility " spoken of by other observers as not specific, but due to psychological factors. He obtained the same sensitiveness to the addiction drug by merely injecting common salt solution ! The method is fascinating in its simplicity, and there appears to be no doubt but that good immediate results have been obtained by it, at any rate among Easterns; but a critical study of the papers mentioned seems to lead irresistibly to the conclusion that the large claims made for it by its originator cannot be substantiated. Nor is there any real evidence that relapse is less frequent than after treatment by more orthodox methods. Hegt found on careful observation of 14 patients who had been " cured " by the vesicant method that five had already relapsed after so short a period as two months. Sioe and Hong did, indeed, think that there was promise of a lessened relapse rate, but neither their own cases nor those originally treated by Modinos were observed for a sufficient time really to determine the point. The blister-serum method may, indeed, prove to be a useful alternative plan in some cases, but it is already evident that no miracles are to be expected from it and much more extended trials are necessary before its final place can be determined.[57] It should be stated that, before applying it, the precaution is taken of testing the urine.

(*b*) *Rapid withdrawal aided by drugs of the opium series.*—No one knowingly commits the error of substituting heroin or cocaine for morphine, as was sometimes done in times past. That would, indeed, be "to exchange Satan for Beelzebub." It is worth noting, however, that Wolff found, in Germany, that some proprietors of private institutions were obviously ignorant that certain proprietary drugs contain opiates, and that these preparations were being innocently used to mitigate the abstinence symptoms in the belief that they contain no narcotic alkaloids. He deprecates, in consequence, the use of drugs of which the name does not disclose the constitution.[40] But there is one drug of the opium series, namely, codeine, which has been found very useful by certain observers during the withdrawal period. The value of the drug in this respect seems first to have been recognized as far back as 1885 by an American physician, Lindberger. Mattison, who gives this information in a paper dated 1893, is himself enthusiastic as to its merits.[36] He gave the drug in doses of 1–3 grains every 2–4 hours, and then gradually stopped it. The use of codeine to alleviate the withdrawal symptoms has been recently revived by Lambert and others.[23a] Lambert believes that "codeine is the only drug that really modifies materially and successfully the withdrawal symptoms of morphine." His procedure is, in outline, as follows :

A ten-day reduction period is allowed, the morphine, etc., being reduced by one-tenth each day. Codeine is begun on the second day, and the dose rises with the decrease of the morphine. The initial doses are ½ grain every four hours, rising the next day to 1 grain, the third day to 4 grains, and 5 grains on the fifth day, all these doses being four-hourly. It is given in the same syringe as the morphine solution and the soluble codeine phosphate is the form chosen. Before beginning the treatment the bowels should be thoroughly evacuated. By this plan of giving the drugs together the patient does not know when the morphine is stopped and he is getting codeine only. The codeine is then gradually tapered off, and saline injections substituted, until the withdrawal symptoms are over. " The advantage of this codeine and morphine treatment," maintains Lambert, " is that the patients suffer so little, there is no occasion for deception, there is no question of a defence reaction for fear of suffering, they get off their treatment without the irritability and fear of suffering that the abrupt methods and old methods of treatment gave them and so they are very manageable." He states that the treatment can quite well be given in hospital.

(*c*) *Rapid withdrawal assisted by endocrine preparations.*—One method is described at length by Farra.[41] The dose of morphine is rapidly diminished and increasing doses of certain endocrine preparations are given. These contain liver extract and suprarenal extract, with other glandular substances. Adrenaline has also been strongly recommended by some authorities for use in the mitigation of the abstinence symptoms. It seems first to have been suggested, or at least first systematically investigated by two Argentine physicians, Rojas and Belby. Hence it is sometimes called the " Argentine method."[44] The method is described by Tassart and is a rapid withdrawal one (ten to twelve days).[42] After the first four or five days, when the dose of morphine has been reduced to a centigramme, adrenaline injections are gradually substituted (a ¼ to ½ c.cm. of the 1 in 1,000 solution) for those of the narcotic, and it is stated that the patients cannot detect the change. Good results have also been reported in eucodalism. Ephetonin, an adrenaline-like preparation which can be given by the mouth, has been tried by Bernhardt[43] and Wuth,[45] but the caution is given, both as regards adrenaline and ephetonin, that in sympatheticotonic patients the use of these drugs is not desirable.

It is interesting to note that the adrenaline and insulin treatments of addiction may possibly be related. According to some recent work by Zunz and La Barre,[46] a hyperinsulinæmia follows the injection of adrenaline, and this substance is claimed to be a physiological excitant of the secretion of insulin. It is not quite certain, however, whether the adrenaline produces its effect directly by actual stimulation of the pancreas itself or indirectly by some other path.

(*d*) *Rapid withdrawal under light anæsthesia.*—This has already been described under abrupt withdrawal.

(*e*) *Rapid withdrawal under drugs of the atropine series.*—According to Lambert, Lott of Texas was the first to use hyoscine in the treatment of morphine addiction, and he pushed its administration to the point of delirium. We will not, however, describe the treatment further since it is now seldom or never employed in this way, though hyoscine is still given by certain experts in a less radical manner and in conjunction with other drugs.

The classical treatment of narcotic addiction by drugs of the atropine series is, however, that of Lambert and Towns, and, though few now employ it exactly as it was originally described, it is still the basis of some modern procedures and deserves a short summary. The preparation used was a mixture of belladonna, hyoscyamus and xanthoxylum in the proportion of two parts of a 15 per cent. tincture of belladonna and one part each of a fluid extract of hyoscyamus and xanthoxylum. At the commencement of the treatment, two drops of this mixture were given hourly, and the dose gradually increased to the limit of the patient's tolerance for belladonna. Simultaneously as rapid a withdrawal of the morphine was conducted as the condition of the patient justified. An essential part of this method was the employment of a very free catharsis by means of blue pill, or some other purgative pill, followed by salines.[47]

Laughton Scott[15] employs Lambert's mixture with the substitution of plain water for xanthoxylum. His plan is to accomplish withdrawal under a gradually developed tolerance to belladonna and hyoscine with a free and increasing use of luminal. The dose is steadily increased and the treatment (which is intermitted at night) is spread over 8 to 14 days, according to severity. The bowels are kept open, but exhausting purgation is avoided. The object aimed at is to secure the slow and careful reduction of the morphine *pari passu* with a development of belladonna tolerance so gradual as not to disturb the mental equilibrium. Post-withdrawal insomnia is combated by large doses of luminal. The author lays stress on the point that his treatment is not a rigid or mechanical one, but is constantly modified and remodified so as to suit the individual needs of each patient. As success depends upon this elasticity of the treatment, it is unnecessary to supplement the above broad outline by further details which may be sought in the author's book. Scott lays much stress upon the avoidance of " withdrawal shock," which he regards as playing " a more important part in the ultimate issue than is generally supposed."

Scopolamine in conjunction with hypnotics is employed by Hahn,[48] and in certain " twilight sleep " methods used in Germany, the details of some of which are not disclosed.

THE GRADUAL WITHDRAWAL METHOD

This is the method recommended by the Departmental Committee, whose description of it will be found in paragraph 38 of their report.[5]

THE CONDITIONED REFLEX METHOD

Charles Rubenstein, of the Los Angeles Sanatorium, has recently made the extremely interesting suggestion to use Pavlov's conditioning method in the treatment of morphine addiction.[49] He describes two cases at length :—

> In the first each hypodermic injection of morphine was accompanied by the ringing of a bell, but later on massage of the dorsal surface of the forearm for one minute after each injection was substituted. In the second case a tuning fork held close to the ear until the vibrations ceased was used as the conditioning stimulus. In each case, after the reflex had been established, sterile injections

(physiological saline or water) replaced the morphine hypodermics. "In both cases it was found that the treatment was rapid and effective and did not produce the so-called withdrawal symptoms." Rubenstein's patients were cases of pulmonary tuberculosis, but the method has obvious possibilities of extension.

SUMMARY

Thus the number of ways in which an addict may be therapeutically separated from his drug is very large, and the difficulty of choice correspondingly great. One thing emerges with great clearness, and that is there is at present neither any true "specific" nor any routine method of disintoxication and, therefore, no "best" treatment in the general sense. Each case has strictly to be considered on its merits, and also in respect of circumstances. As McIver and Price said long ago: "To try to bend the patient to a machine treatment is a very unwise procedure."[50] We have already stated that the gradual reduction method is regarded in this country as being, on the whole, the most suitable procedure, but this does not exclude a consideration of one of the rapid methods, or even one of the abrupt methods in favourable cases. The decision must ultimately be left to the physician himself, who alone is in possession of all the relevant facts in respect of any individual patient. Most observers agree, however, that cocaine may safely be withdrawn at once since the abstinence symptoms, unlike those in respect of morphine and heroin, are slight.

It is remarkable that those who employ the older methods are very conservative in their estimates, while the originators of new treatments are in the front rank of optimists. Perhaps when the newer procedures have themselves become mellowed by time, the enthusiasm of their sponsors will have become mellowed also. Too often the results reported merely mean that denarcotization has been successfully carried out. It may be that the mode of disintoxication employed has some indirect influence upon the relapse rate, yet though disintoxication and rehabilitation can only be artificially separated it is wise from the practical point of view to think of them as two entirely separate and distinct stages in the treatment of addiction.

(2) *Rehabilitation.*—Having liberated the addict from his drug, the next step is to liberate him from himself. The treatment necessary to effect this is not only more difficult to carry out than disintoxication, but is more difficult to describe. For it is little less than the description of the creation of a soul " under the ribs of death." Mignard is quite right when he says: " In one sense every cure of narcomania, serious enough to have lasting effects, means a complete renewal of the mental bent and is in reality a sort of conversion."[51] He also makes another very wise remark: *On ne detruit que ce l'on remplace.* We might even say that the craving is rather ousted than destroyed. The craving is only permanently removed if we substitute in its place something stronger and more potent. The old maxim that nature abhors a vacuum, though out of date in physics, still holds good in psychics.

Though it is convenient to separate the description of after-treatment and rehabilitation from that of relapse, yet a knowledge of the causes of relapse furnishes many valuable hints for the formulation of a plan of re-education. Obviously, the first matter to claim our attention is our patient's body, for psyche and soma, soul and body, act and react the one upon the other. The wise physician will study the causes which have led to the patient's addiction and, if possible, remove them. The origin of the habit may, for example, have been insomnia or some distressing or painful bodily ailment, and if this is capable of cure or alleviation, appropriate steps should be taken to bring this about. If we read the biographies of De Quincey and Coleridge, it is difficult to resist a conviction that had the former been advised to take sufficient walking exercise, and had the latter's neuralgia been efficiently treated, it is possible that neither would have become an opium eater. But De Quincey fell into the hands of a crude purveyor of purgatives, and Coleridge chose to treat his own ailment.

As soon as the disintoxication period is satisfactorily completed, the patient's health should be built up by all means available, and, apart from medical treatment proper, there are two measures of great value : physical training and work. Lambert advises that the patient be sent, where circumstances permit, to a good physical trainer.[47] And he must *work* as soon as he is able. We must endeavour, as Mignard says, to replace the craving by means of those activities which the addict has too often discarded when he took up his habit. The work must be adapted to the patient's abilities and, where he has the capacity, intellectual and artistic distractions must also be provided. We aim at a "sublimation of tendencies illuminated by intelligence." Healthy sports have also their place, and an important one, in the process of up-building. His sense of responsibility to his family and to society must be cultivated anew. But though he must work and re-create, physical or mental fatigue should be carefully avoided. David warns that physical fatigue or mental lassitude, especially when combined with *tedium vitæ*, constitute the greatest danger for the cured habitué who has resumed work.[52] If he is a solitary, he should endeavour to become what Americans term a "good mixer," for in the addict's case the old proverb is reversed, and he is never more alone than when alone. If he is gregarious, he must change his herd. But he must be careful with whom he mixes. If, as is not seldom the case, his habit has been contracted through bad company and bad surroundings, a complete cut must be made from his former environment. The object of after-treatment is, as Dixon insisted, to replace association memories by substituting more dominant desires.[53]

In addition to all this, many experts are convinced of the great value of special treatment by one of the modern methods of "cathartic analysis." Addicts must, it is emphasized, be dealt with psychotherapeutically and the personality developed in a frankly pedagogic fashion. "In this re-education of the personality lies the chief hope of preventing relapse."[52] Many of the speakers at the recent discussion held at the Royal Society of Medicine also insisted upon this aspect of the matter. Dr. William Brown, while suggesting the employment of hypnotism in suitable subjects to mitigate the pains of withdrawal, stated that prolonged analysis was always necessary in addition, and Dr. Glover pointed out that the importance of a drug to the patient was largely psychological. Any non-psychological treatment, he said, might be compared to regarding scarlet fever as the "scarlet habit" and powdering the rash until it disappeared! The underlying narcissistic elements and paranoid tendencies were very important. We will not describe these methods. To do so in outline would be useless; to do so in detail would require more than all the pages of this journal. In any case, if it be decided to enlist the aid of psychotherapeutic methods, the patient will have to be entrusted to the care of an expert in such matters. Short of this, however, the personality of the physician counts for much, and without being an adept at psychotherapy, he can try to infuse his own saner mentality into the damaged psyche of his patient.

All this, of course, is extremely difficult of accomplishment. It is easier to say what should be done than to give practical advice as to how it is to be done. Very often we get no help from the addict himself. Though most will agree with Kolb[54] that practically all addicts, except the criminal psychopaths, would like to be cured, yet most will also agree with him when he states that the motives which prompt many of them to seek cure are fundamentally inadequate and, therefore, usually ineffective. Their main urges are only too frequently the difficulties and inconveniences attaching to supply, the disapproval of their fellows and the social disesteem in which they are held, the fear of the law, the importunities of relatives and friends, and so on. Kolb, too, is undoubtedly right when he says that many addicts tend to take the view that the community should accept their addiction as an accomplished fact and leave them alone. Some practitioners are so impressed with the difficulty of after-care and rehabilitation that they would recommend long periods of surveillance in an institution and, on discharge, a renewed and prolonged supervision by a special medico-social service organized in connection with the treatment centre and, if necessary, compulsory re-treatments. Something of the sort seems now to be in operation in Brazil,[1] and in the case of criminal addicts, as well as some others, an experiment is shortly to be conducted in America by the provision of two "Narcotic Farms," for one of which a site has been chosen at Lexington, Kentucky (to accommodate 1,000 inmates), and plans are under way for the development of necessary buildings thereon. Another site has been selected near Fort Worth, Texas.[55] These farms will be administered by the Division of Mental Hygiene, by which name the old Narcotics Division of the United States Public Health Service is now designated. These institutions will be devoted to the cure and rehabilitation of the addicts consigned to them. The good effect of a very prolonged supervision is well seen by a study of the figures given by Nellans and Massee[10] for the Atlanta Penitentiary. In addict prisoners incarcerated for less than a year, the relapse rate was 90 per cent., but in cases in which the stay was from three to five years, that rate was only 17 per cent. It is obvious, however, that such thoroughgoing measures are not practicable, and perhaps not even desirable in countries in which the addiction problem is not serious. However, in countries in which that problem is serious, opinion is undoubtedly moving in the direction of more radical measures than have hitherto been generally contemplated.

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(*Concluded*)

Spontaneous Subarachnoid Hæmorrhage

By C. ALLAN BIRCH, M.D., M.R.C.P., D.P.H.

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SPONTANEOUS subarachnoid hæmorrhage is a condition to which an increasing amount of attention has been paid in recent years, and especially since routine lumbar puncture in doubtful cases has enabled us to distinguish this condition from other intra-cranial vascular accidents. As a pathological entity it has been known for a long time. Samuel Wilks[1] mentioned it in the summer session lectures of Guy's Hospital in 1857, and gave a very concise account of the condition : " The blood may run beneath the arachnoid when the brain is injured or when meningeal apoplexy is a spontaneous disease, or when an apoplexy reaches the surface, or an aneurysm bursts or a tumour bleeds there." Apart from a few isolated cases it has only recently been recognized clinically.

The classical picture is the sudden onset of symptoms of meningeal irritation with absence of localizing signs and the occurrence of retinal hæmorrhages and a blood-stained cerebrospinal fluid. From many published cases, however, it is evident that numerous other symptoms may occur. The current views as to etiology and the chief clinical variations will be briefly considered.

Etiology.—Hæmorrhage into the subarachnoid space may be diffuse or localized, e.g. petechial, and may vary in extent. It may be a complicating part of the picture of cerebral tumour, tuberculous meningitis, sunstroke, pertussis, septicæmia (especially anthrax), epidemic encephalitis, and blood diseases, such as leukæmia, hæmophilia, and purpura. We are here concerned, however, with gross subarachnoid hæmorrhage in a patient with either no other demonstrable lesion or one causing few symptoms. This type of subarachnoid hæmorrhage may be found in association with the following conditions:—(1) arteriosclerosis; (2) " berry " or congenital aneurysms; (3) subacute infective endocarditis; (4) coarctation of the aorta; (5) polyarteritis acuta nodosa. Most cases belong to the first two groups. When subarachnoid hæmorrhage occurs in these conditions it is of sudden onset. There is no injury or obvious precipitating factor, and the term " spontaneous " seems justifiable.

The origin of intracranial aneurysms is not definitely known. Eppinger considers that they are congenital because they have been found in infants and are sometimes associated with other vascular abnormalities, such as nævi. Fernsides[2] found them in 1 in 125 of 5,432 necropsies. No inflammatory changes have been demonstrated in the aneurysms, but Collier[3] thinks they may be due to an otherwise symptomless blood infection. In all reported cases of subarachnoid hæmorrhage due to aneurysm formation in which it has been performed the Wassermann reaction has been negative, but in 10 cases without aneurysm out of a total of 124 cases of subarachnoid hæmorrhage collected by Symonds[4] syphilis was present.

Symptoms.—Symptoms may arise before rupture, if one of these " berry " aneurysms becomes adherent to a cranial nerve. If calcification occurs in the wall of an aneurysm it may be demonstrated by X-rays. Other evidence of arterial disease may be present, but in many cases of subarachnoid hæmorrhage there are no premonitory symptoms. It should be noted that the vessel affected by arteriosclerosis, aneurysm, etc., may be in any situation, so that various syndromes may be found when rupture occurs. " Berry " aneurysms are most often found in the region of the circle of Willis, possibly because of the complicated development of the vessels in this region. Hæmorrhage into the cisterna basalis spreading into the general subarachnoid space is therefore prone to occur. It is with these cases of subarachnoid rupture with diffuse spreading hæmorrhage that we are here concerned. It should also be noted that the sudden onset of coma without localizing signs and the finding of a bloody cerebrospinal fluid and retinal hæmorrhages may occur in a large cerebral hæmorrhage which has ruptured into the ventricles (the cerebro-meningeal hæmorrhage of Froin), since complete suppression of tone and reflexes is present at first. Such a case is invariably fatal and could not on clinical grounds be distinguished from a diffuse rapidly fatal subarachnoid hæmorrhage. If a case presenting this picture recovers it is probable that the hæmorrhage was subarachnoid only.

When rupture occurs the features of meningitis of sudden onset appear. Headache is usually intense and occipital, and there is stiffness of the neck, vomiting and often diplopia. Pyrexia may be absent at first. If the hæmorrhage is extensive, coma, deepening into death, is usual. There is, as a rule, no paresis or other localizing sign, but transient and variable extensor plantar responses may be found. In other cases leakage from a vessel may occur many times before a large rupture leads to death. Many variable symptoms then occur, such as headache, aphasia, impairment of memory, and paralyses of cranial nerves. In some cases headache may be absent. Sometimes encephalitis lethargica is simulated very closely, more especially when there is also subdural hæmorrhage. Certain rarer phenomena have been described in subarachnoid hæmorrhage. Massive albuminuria and glycosuria may be found and suggest medullary irritation. Korsakov's syndrome sometimes occurs during recovery, but the mental symptoms usually disappear completely.

Methods of diagnosis.—Two procedures are essential in arriving at a diagnosis: (1) ophthalmoscopy; (2)

lumbar puncture. Retinal and sub-hyaloid hæmorrhages may be found and give a clue to the diagnosis. They may be due to direct passage of blood along the sheath of the optic nerve, but since they may occur when the hæmorrhage never reaches the optic nerve they must also be due to increased intracranial pressure which causes obstruction to the return of blood from the ophthalmic veins. Lumbar puncture will reveal blood which can be distinguished from blood due to the puncture itself by the fact that it is uniformly distributed in all samples and does not clot, and also that the supernatant fluid is often yellow. Between the repeated bleedings of slow subarachnoid hæmorrhage and after a large non-fatal bleeding the cerebro-spinal fluid may be very yellow and contain flakes of lymph. There is, however, no marked dissociation of cells and protein which would suggest a loculation syndrome. It is important to realize that lumbar puncture in these cases may reveal almost pure blood, since the diagnosis has occasionally been missed in comatose patients because the blood was ascribed to accidental puncture of veins and the fact that the spinal theca had been entered was not recognized.

Treatment.—When there is no underlying condition, such as endocarditis, requiring treatment we have to rely on symptomatic measures. There has been considerable difference of opinion as to the value of draining off cerebro-spinal fluid. It is now generally agreed that it is a useful measure and the objection that it may increase the bleeding is not valid, since the rise of intracranial pressure produced by the escape of blood from a vessel raises the pressure in the vessel itself and so tends to increase the bleeding. Lumbar puncture by lowering intracranial pressure also lowers the pressure in the cerebral arteries and tends to stop the bleeding. If the symptoms are due to increased intracranial pressure lumbar puncture will relieve them, and in any given case the manometer should be the guide. In cases not immediately fatal improvement often follows repeated lumbar puncture after the first few days. In addition to causing increased pressure, blood also acts as a foreign substance in the subarachnoid space. Bagley[5] has shown that it may cause meningeal thickening which may block the channels through which cerebro-spinal fluid is returned to the blood stream, and on these grounds also repeated lumbar puncture is indicated.

The following cases illustrate the condition :—

Case 1.—Male, aged 43, complained of pain in the back of the head and neck and soon afterwards felt faint and vomited. He became semi-conscious and was admitted to hospital. Bilateral extensor plantar responses before admission but, subsequently, flexor. Pupils normal. Bilateral papillœdema with hæmorrhages. Urine : Trace of albumin. A few casts. No sugar. No obvious arteriosclerosis or cardiac enlargement. C.S.F. uniformly and heavily blood-stained. Death occurred 15 hours after admission. Autopsy showed rupture of a branch of the right anterior cerebral artery. No aneurysm or hæmorrhage into cerebral substance.

Case 2.—Male, aged 56, collapsed at a race meeting and was admitted in coma. No history of previous illness. No paralysis or evidence of a localized lesion of C.N.S. Optic discs normal. B.P. 110, 80. Urine normal. C.S.F. uniformly blood-stained. Autopsy showed a diffuse subarachnoid hæmorrhage. No aneurysm present. Basal arteries very atheromatous. Site of rupture not found.

Case 3.—Female, aged 42. Became ill in the street and had pain in the neck and a feeling of tightness in the head. She vomited a few times and gradually lost consciousness. After a few hours consciousness returned but she remained stuporose. Both pupils dilated and fixed. There was a hæmorrhage in the outer side of the right disc. C.N.S. negative, apart from some neck rigidity. C.S.F. uniformly blood-stained. Protein increased. Sugar 63 mgms and chlorides 737 mgms per 100 c.cm. W.R. negative. Later she became apparently normal, but 18 days after the onset she suddenly became comatose and died. Lumbar puncture just before death produced almost pure blood. At autopsy, there was organizing blood clot over the right cerebral hemisphere and recent blood clot at the base of the brain. No hæmorrhage into brain substance. Site of origin not found.

Case 4.—Male, aged 12, complained of headache and collapsed when playing cricket. He was comatose when admitted to hospital and all his limbs were flaccid with absent reflexes. He improved slightly and his previously fixed pupils reacted to light. Optic discs were normal. C.S.F. diffusely blood-stained. W.R. negative. Next day he became worse and died. Autopsy revealed a diffuse subarachnoid hæmorrhage involving the base and vertex of the brain and extending down the cord; the site of origin not found.

Case 5.—Female, aged 33, complained of severe occipital headache and vomiting a month before she suddenly became comatose. No evidence of a localized lesion of the brain. Optic discs normal. Urine: Trace of albumin; no sugar. C.S.F. contained much blood. At autopsy, there was extensive subarachnoid hæmorrhage at the base and over the right cerebral hemisphere. At the junction of the right anterior cerebral and anterior communicating arteries was a tiny ruptured aneurysm. No laceration of the cerebral substance.

Case 6.—Male, aged 30. Had sudden severe occipital pain and fell unconscious. Two and a half hours later he recovered consciousness and complained of very severe headache. Apart from marked neck stiffness no physical signs could be detected; discs normal. C.S.F. contained much blood. W.R. negative. Six days later, he became comatose and died. No autopsy.

Case 7.—Male, aged 50. Suddenly collapsed at work and became semi-comatose. No localizing signs. C.S.F. uniformly blood-stained. Optic discs normal. W.R. negative. He recovered rapidly and left hospital normal, apart from slight impairment of memory.

Case 8.—Male, aged 38. For five days before admission he had severe frontal headache of sudden onset. He was dull and drowsy, showed rigidity of the neck and a hæmorrhage in the right retina. C.S.F. contained much blood and the supernatant fluid was yellow. Left hospital one month later but was mentally dull.

Case 9.—Male, aged 10. Developed very severe occipital headache and vomiting while bathing. There was no injury. The only finding on examination was slight bilateral papillœdema without hæmorrhages. C.S.F. uniformly blood-stained. W.R. negative. Five weeks later he was normal.

Case 10.—Male, aged 44. Collapsed when getting up one morning and had severe left-sided headache which persisted for four days. On examination, slight bilateral papillœdema was present. C.S.F. yellow and contained numerous red blood cells. W.R. negative This patient subsequently became normal.

Summary of cases.—10 cases are described; 8 were males (ages from 10 to 56), and 2 females (aged 33 and 42); there were 6 deaths (4 male and 2 female); the condition was confirmed at autopsy in 5 cases. An aneurysm was present in one patient and marked cerebral arteriosclerosis in another. In the remaining 3 fatal cases the investigations made did not reveal any obvious cause. In all cases lumbar puncture confirmed the clinical diagnosis.

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Sensitization to Wheat

By FRANK COKE, F.R.C.S.

SOME typical examples of the clinical manifestations seen in those sensitive to foreign proteins are hay-fever from pollen, asthma from horses, and urticaria from shell-fish. All proteins, other than those forming part of the human body, are " foreign " to man, so that the range of proteins to which a patient may be sensitive is enormous, and the resulting disease takes many forms—asthma, eczema, rhinitis, urticaria, colitis, pruritis, migraine, and less often epilepsy and arthritis. These phenomena due to sensitization to proteins are known collectively as "anaphylactic," "allergic," or "atopic."

During the last ten years or so, it has been the custom of many to make use of the dermal reactions to test the patient's susceptibility to proteins; any protein that may be suspect is applied to a small scratch on the arm. About twenty minutes later a wheal like a nettle-sting will be found at that spot, recording a positive reaction if the patient is sensitive to the protein applied. Some proteins seem to cause larger wheals and greater clinical upsets than others; but there is no suggestion of any one protein being more toxic than any other; it is simply that some have greater powers of producing these allergic shocks than others. Nor can proteins be ranged in degrees of " foreignness " to man. Horse hair, pollen, Brazil nut and eggs are amongst those producing the largest wheals and the maximum discomfort.

However that may be, one would certainly expect to find wheat the least harmful of all, a food which is taken at least three times a day during a lifetime. I have always held that to become sensitive to a protein it is necessary to have an excessive dose of that protein, and then an incubation period—an interval of not less than two weeks free from the protein. If this were so, one would hardly expect to find anyone sensitive to such a food as wheat, taken every day of the year; nevertheless, there is much evidence to support my argument. This article is based on the results obtained in testing 2,000 consecutive cases of asthma to the wheat protein. Fifty-nine patients, twenty-six were females and thirty-three males, gave positive reactions to wheat (3 per cent.).

The age of the onset is interesting, and suggests how these cases have become sensitive to wheat. Sixty-one per cent. showed symptoms before the age of two years, and 80 per cent. were under ten years of age. In early life, and especially in infancy, it has been found that protein ingested may pass right through the system, appearing in the urine, as shown by Schloss with regard to egg albumen in infants. Until quite recently we were taught that whole proteins did not pass into the system, it being supposed that hydrolysis occurred, reducing the whole proteins to much smaller molecules—the peptones and amino-acids. What is known as the Prausnitz—Küstner reaction throws much light on this. Blood from a patient sensitive to fish is injected subcutaneously into the arm of a normal person. If, now, the normal person takes fish by the mouth within the next day or so, a large erythematous swelling occurs at the site of the injection. The interesting point is, therefore, that fish eaten by the normal man passes through into his system as a protein, or at any rate in a large enough molecule to maintain its specificity as fish.

Going back to those infants who become sensitive to wheat, infancy is just such a time as they may be given wheat when they should be having mother's milk, and when longish intervals may occur, the food being suddenly changed again to a non-wheat diet, before the child is old enough to have arrived at the three-times-a-day regime of wheat, as taken by grown-ups. A very great number of these children—74 per cent.—

have suffered from eczema before the asthma developed —a dry form of eczema, chiefly in the flexures and around the wrists and fingers; in many this persists until they are grown up; in others the skin is dry and ichthyotic. Most of those who develop asthma in later life and who are sensitive to wheat are bakers, cooks or millers, the flour being inhaled into the lungs. Probably they, too, have intervals, such as holidays, affording incubation periods, wherein they develop the sensitization. Thus a baker left South Africa, where he was normal, but shortly after arriving in England—the incubation period having occurred on the boat—he was sensitized to wheat, and asthma developed.

Most of these cases are sensitive to other proteins as well as wheat. Sometimes there is a general sensitization to all the cereals, oats, barley, wheat and even rye; but quite often the patient shows no reaction to the other cereals, illustrating the extreme specificity of these reactions. I use the prepared and dried proteins in powder, and I think other forms of wheat are apt to give unreliable results. Flour becomes so easily contaminated by moulds that reactions may be obtained which have nothing to do with wheat, but rather to moulds and house dust.

There are, then, two main types of sensitization to wheat, one commencing in the earliest infancy, the other later in life, from some occupational or accidental surfeit of wheat. There seems to be a further distinguishing feature between the two, namely, that the children's form is due to intaking of wheat by the mouth, and most usually as bread, while the other affects the air passages, and is usually caused by flour, no ill result apparently following the taking of bread. Perhaps the most extraordinary fact about these types is the complete lack of suspicion that wheat is the cause of the patient's troubles. Without the help of routine skin testing it would have been quite difficult to elucidate many of the following problems:—

Case 1.—Miss X, aged 39 years, perfectly fit until two years ago. Has since had very occasional, but very severe, swelling of face, lips and back of the throat, violent sneezing bouts, and congestion of the conjunctivæ. At the same time some asthma develops, and altogether she feels as though she may be choked. The attacks occur mostly after lunch, and she thinks they may be due to beef. They usually occur at the same time as the menses. No family or other history that helps. Tested with 43 proteins, she gave large reactions to wheat, flour and barley; none to oats. Going back to the gross attack which she had last week, she had for lunch an apple mixture that was thickly covered with white sugar and flour. Past attacks had probably been of the same nature. Further cross-questioning elicited this strange history: Shortly before being troubled with this complaint, she was at some gathering of young people when the following rather foolish game was played. There was a bowl of flour, over which it was the game to get the victim to place her head, on some such promise that if she stared long enough into the flour she would see the man she was going to marry. Meanwhile, at the appropriate moment, her head was ducked into the flour. Beyond spluttering, she does not remember being upset by the flour, but that, no doubt, proved to be the sensitizing dose. She writes to me now that she is perfectly well, but finds that she has to avoid all contact with flour in order to keep so.

Case 2.—A man, aged 33, working in an experimental gas station on Salisbury Plain, was sent to me because of eczema, thought to be due possibly to arsenic. Hay fever for 17 years, and a long history of eczema, which goes away when thoroughly sunburnt. Lost it for a year in Rangoon. Dermal reactions showed extreme sensitiveness to wheat, less to other cereals. Avoidance of these, and a course of mixed coliform vaccine so far improved him that he returned to work, and was very well.

Wheat is, of course, nothing more than a cultivated grass, but I have not found sensitization to pollen to be commonly associated with sensitization to wheat, any more than is sensitization to feathers, eggs and chicken flesh, so specific is the reaction.

Case 3.—Mrs. R, aged 47, took porridge for breakfast every day of her life until 16, then had an attack of "gastric flu"; on resuming porridge some time later she found that it gave her nettlerash on the face and inside the mouth, and an attack of asthma developed within the hour. So she avoided it, but found that every time she took oatmeal by mistake she was ill in this way. She noticed also that the ingestion of oats brought on the period very soon afterwards. She gave large reactions to oats, barley and wheat. This case showed a very clearly spaced incubation period.

Case 4.—Mr. N, aged 38, a baker, started asthma at the age of 21. Had a cold, bronchitis, and then asthma. Now he goes six months free, but asthma develops as soon as he gets a cold, if he remains at work. Sneezes much at times, especially when using self-raising

flour. Gives very large reactions to wheat and oats. Advised to get a mixing machine, as only the dry flour affects him, and was well after doing so.

Many patients only have attacks of asthma when they catch colds. At that time the nose and throat become raw with the cold and allow the protein to pass through, which normal mucous membrane is able to keep out, so that the flour affects them. Children who have asthma with a cold are often found to be sensitive to feathers. The substitution of kapok pillows will then allow them to catch colds without being followed by the usual sequence of asthma. But if this fact is not recognized, a cold means asthma, and the turgescence caused by the asthma invites the cold to travel down the bronchial tubes, laying further tracts open to the reception of the protein, and a vicious circle starts. Added to this, the patient is kept in bed with an increased number of pillows, and thereupon commences an imprisonment from which it may take him months to escape.

The treatment of these people who are sensitive to wheat is mainly by the method of avoidance. The better educated the patient, the more easily is this accomplished. Rice, potatoes, and the other cereals, if the patient is not found to be sensitive to them, can be taken in sufficient quantities to supply the carbohydrate requirements. Rusks can be taken, and a method of making these at home is to cut up into slices what is known as " milk bread " and to bake it brown in the oven. Whereas ordinary bread would become so hard that it could not be eaten, this milk bread becomes a rusk, and is easily masticated. Special mixing machines are of great assistance to bakers; others are able to avoid flour, once they know that they are sensitive to it.

I have not used the methods of specific de-sensitization for wheat, but non-specific methods, such as peptone and the mixed coliform vaccine, often make a considerable reduction in the degree of sensitivity, and allow of a little greater freedom in the patient's dealings with wheat.

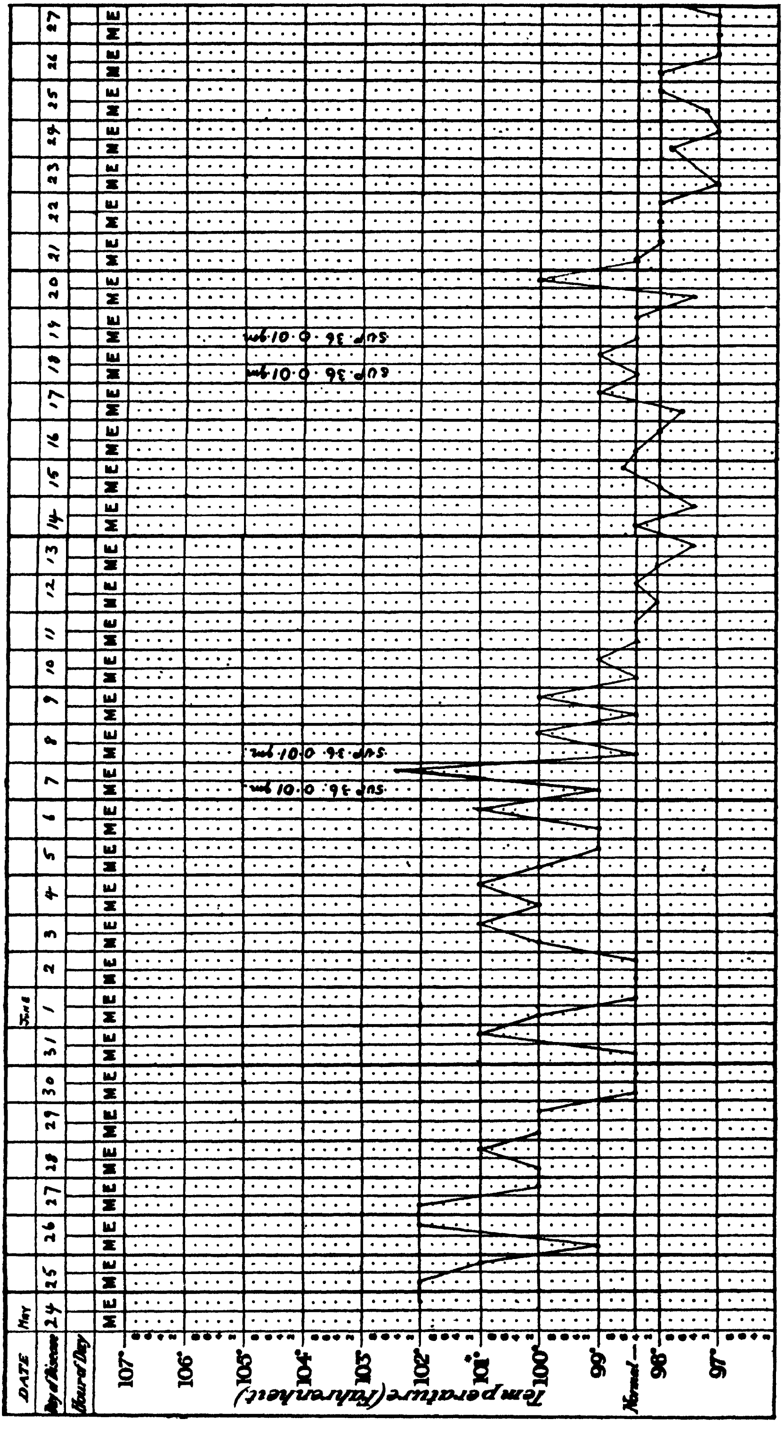
Case Report

A Case of Undulant Fever

BY GEOFFREY B. THRIFT, M.D.

THE following isolated case of undulant fever, which occurred in a crowded district in Derby, may be of interest. The patient, a girl, and her mother were accustomed to drinking a tumbler of milk every morning. It became known later that the farmer who supplied the milk had had five cases of abortion amongst the cattle on his farm.

The girl, aged 17, one of a family of nine, was first seen by me on the evening of May 24th, 1932. She had been " out-of-sorts " for two or three weeks previously; during this time she had complained of headaches and had been very irritable, an unusual thing for her. On May 20th she had a rigor and vomited once or twice. The vomiting was repeated on the following two days. The headache became much worse and she complained of being very tired. She was very constipated. When I saw her she had a temperature of 102° F. and a pulse-rate of 90. Her tongue was very coated and covered with a yellow fur. She complained of severe frontal and occipital headache, and pains in both ankles and knees. I could find nothing in the chest, abdomen, nervous system, or joints to account for her condition. The following morning her temperature was still 102° F.; the headache was confined to the occipital region and there appeared to be some neck rigidity with pain on flexing the head. She had vomited once more and the bowels were still constipated. In view of this combination of signs I thought it best to do a lumbar puncture. The spinal fluid appeared quite normal, a fact which was confirmed by bacteriological examination. The next day she was tender on palpation in the epigastric, splenic and right iliac regions. She had also developed an acute deafness in both ears; she had no pains in the ears and the tympanic membranes appeared quite normal. The bowels had moved and the motions were offensive, loose and of a pale brown colour. She was seen by my partner, Dr. Kinsey, on the same day, and we thought it was probably a case of typhoid fever. The headache, neck rigidity, vomiting, pains in the joints and deafness were only transient and did not recur. The urine was not examined during the first week as the patient was menstruating, but later it was found to contain a small amount of albumin; this albuminuria cleared up in a few days. The temperature continued to fluctuate, as is shown in the accompanying chart. The pulse-rate was never more than 96. The bowels became quite normal in about a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week's time. There were no further signs beyond the tenderness in the abdomen in the regions already mentioned.

On the eighth day (May 30th) I sent the patient's blood for a Widal test for the typhoid group; the blood was reported as giving a negative reaction with *B. typhosus*, *B. para-typhosus A* and *B*, and *B. gærtner*, but a positive reaction with *Br. abortus* and *B. melitensis*. On June 5th the blood-picture showed a slight increase in the relative size and shape of the red cells, with a distinct lymphocytosis—polymorphonuclears 41 per cent., large lymphocytes 34 per cent., small lymphocytes 25 per cent. On June 7th she was feeling much better and was anxious to have something to eat. She was still running on evening temperature and admitted having heavy sweats every night. At this stage I decided to give her an intramuscular injection of 0·01 gram of S.U.P. 36, as suggested by Dr. Forbes (*B.M.J.*, June 4th, 1932). Her temperature was 99° F. on the morning of the injection and rose to 102·4° F. the same evening. The following morning her temperature was normal, but I repeated the injection. Her temperature came down by lysis and stayed down for six days, only to rise on the evening of June 17th to 99° F. At this time the tenderness over the liver and spleen was more marked, the liver and spleen being definitely enlarged. On June 18th and 19th I gave her two further injections of 0·01 gram of S.U.P. 36. Her temperature on the evening of June 20th was 100° F. This was the last occasion on which the temperature was above normal.

She continued to make good progress, although she still complained of heavy sweats at night. She was able to get up by June 24th and was out by the end of the month. She continued to have slight tenderness over the spleen and liver and in the right iliac region, but this passed off in a short time and she appears to be quite well again now.

BACTERIOLOGICAL EXAMINATIONS

The specimen of blood sent on May 30th gave a positive Widal reaction to *Br. abortus* with a dilution of 1/250 and to *B. melitensis* with a dilution of 1/125. Specimens of urine and fæces sent at the same time showed no organisms of the typhoid, paratyphoid or dysentery groups. The specimen of blood sent on June 10th gave a positive Widal reaction to *Br. abortus* with a dilution of 1/250 and to *B. melitensis* with a dilution of 1/50. *Br. abortus* could not be isolated from the milk obtained on the farm. A guinea-pig was injected with the milk with negative results.

I am indebted to Dr. W. M. Ash and Dr. Ross for permission to publish the details of the above examinations.

Practical Notes

Headaches

Julius Friedenwald and T. H. Morrison publish an interesting article on headaches, especially associated with digestive disorders. Headaches may be caused by many conditions and should always be regarded in the light of a symptom and not as a disease. In order to establish the direct cause a most thorough clinical study is required. It is quite evident that before pronouncing a headache of digestive origin causes outside of the digestive tract must be excluded. Headaches of digestive origin may be divided into two classes: those produced by organic and those by functional disease. Among those of organic origin are the ones associated with intestinal stasis, duodenal stasis and chronic cholecystitis. Whether the headaches due to intestinal stasis are reflex or toxic has not as yet been satisfactorily determined. In duodenal stasis headaches play a more or less persistent rôle. They may become incessant and migraine attacks are not infrequent as the result of toxæmia; which may be of so high a degree as to finally eventuate into an alkalosis. Headaches may occur in disturbances of the gall-bladder associated with jaundice and are the result of a toxæmia. Of the functional disturbances of the digestive tract associated with headaches the most common are those found in hyperchlorhydria and hypochlorhydria and gastro-intestinal neurasthenia. These are reflex in origin and are relieved by the administration of alkalis or acids, respectively. Headaches are exceedingly common in many forms of gastro-intestinal neuroses especially those associated with exhaustive states. They are frequently induced by over-exhaustion, both physical and mental, or by an exacerbation of the digestive symptoms. Rest ordinarily affords relief of this type of headache. Migraine may be at times of digestive origin. Occasionally a slight enlargement of the liver with tenderness in this region occurs during an attack and in some cases a fullness or pain has been noted in the region of the liver in addition to a distinct yellow cast of the skin. Stasis in the upper intestinal tract frequently plays an important rôle in the production of some attacks. From recent studies the impression is gaining ground that attacks of migraine may be regarded in some instances in the light of an allergic reaction due to a sensitization to certain proteins in our usual food and in others to excessive use of and faulty carbohydrate metabolism. In the treatment of headaches associated with the gastro-intestinal tract, relief can only be obtained when it is directed to the underlying cause. This necessarily involves the cure of the digestive disturbance itself.—(*Medical Journal and Record*, New York, July 20, 1932, cxxxvi, 45.)

The Treatment of Hæmorrhage in Peptic Ulcers

Max Einhorn states that in his experience the duodenal tube has proved of the greatest possible value not only in the treatment of chronic simple peptic ulcers but also of peptic ulcers complicated by acute hæmorrhage. He frequently employs the duodenal tube a short time (six to twelve hours) after a hæmorrhage and has never had cause to regret this; in certain urgent cases he has even introduced the duodenal tube immediately after the hæmorrhage. His treatment of a case includes absolute rest in bed, an ice-bag over the stomach, adrenaline (eight minims of the 1-1000 solution in a teaspoonful of water) by the mouth thrice daily, and the injection of hæmoplastin. Since Einhorn has employed the duodenal tube he has never required to have recourse to transfusion, for feeding by the duodenal tube allows the patient to make his own blood.—(*Le progrès médical*, July 30, 1932, lix, 1345.)

The Cause of Death in Stillbirth

J. B. Gillespie, Fellow in Pediatrics, the Mayo Foundation, has analysed the causes of death in 338 cases of stillbirth, as determined by post-mortem examination. The subjects came from an extensive metropolitan area, and were referred for post-mortem examination by general practitioners and specialists. Gillespie found that trauma at birth held a paramount place among the causes of fœtal death, and prematurity, from whatever cause, was a potent factor. The deaths due to trauma at birth constituted 29·88 per cent. of all the stillbirths, and the frequency of trauma increased with age, the greatest incidence being at ten months or more. In cases in which the fœtus had matured or was past maturity, the size of the fœtus was a factor necessitating operative procedure in which trauma was not infrequent. The most common injury at birth was laceration of the false cerebri, the tentorium cerebelli, or both, with or without intracranial hæmorrhage. In four cases there was hæmorrhage in the suprarenal glands and in one case the sole evidence of trauma was bilateral lacerations of these glands. Rupture of the liver and hæmorrhage from it occurred in three cases, besides intracranial injury. In six cases one or more bones of the skull were fractured.—(*American Journal of Diseases of Children*, July, 1932, xliv, 9.)

The Treatment of Hodgkin's Disease

E. L. Jenkinson is of opinion that in the treatment of Hodgkin's disease, localized well-directed irradiation is superior to generalized treatment. For a number of years he was accustomed to treat by X-rays the entire lymphatic system of all patients suffering from Hodgkin's disease, as a prophylactic precaution. Some three years ago, however, he discontinued the practice of generalized irradiation in Hodgkin's disease and began treating only the enlarged glands, also placing the patient on a liberal diet, accompanied by plenty of rest and sunshine, in the belief that improving the patient's resistance acted as a definite barrier to the progress of the disease. When a patient presents himself for treatment and enlarged cervical and axillary glands are found, Jenkinson irradiates these areas, using a dose up to the point of a mild erythema, attempting to destroy the glands with one treatment. No more treatment is given unless other glands become enlarged.—(*Radiology*, New York, July, 1932, xix, 41.)

The Treatment of the "Indigestion Complex" with Emetine

A. Melvin Ramsay writes that he found flatulent dyspepsia to be very frequently due to simple enlargement of the liver, and that it could be successfully treated with emetine. Among the 38 cases on which his conclusions are based, the liver enlargement is ascribed in many to no definite cause, in a few to malaria, and in others to amœbic dysentery. In some the enlargement was slight, if at all demonstrable, but all cases had three complaints and three symptoms in common. The complaints were: (1) The patients had all suffered from indigestion for years; (2) they had consulted many practitioners; (3) they had made the fortunes of many chemists. The three characteristic symptoms were: (1) flatulence; (2) loss of appetite, practically always combined with a bad taste in the mouth; (3) a constant feeling of tiredness. In the average case routine treatment consisted in subcutaneous injections of gr. ½ emetine twice a week for three weeks. (Emetine must be injected into the loose subcutaneous tissues; given intradermally or intramuscularly it will cause a necrosis. Further there is a danger of peripheral neuritis occurring after overdosage.) The result in all cases is described by the author as remarkable, and as a result of his experience he concludes that: (1) emetine is the only drug which acts directly on the liver cell; and (2) the muddy complexion, furred tongue—indigestion complex—yields to emetine irrespective of liver enlargement. The latter seems to be merely a later development of the trouble. Details of ten of the cases are given.—(*South African Medical Journal*, 28 May, 1932, 334.)

The Treatment of Lupus Vulgaris

H. Katerbow, Chief Physician of the Sanatorium at Oranienburg, has used with success an old-fashioned method in the treatment of lupus vulgaris. The method consists in burning the affected areas by sun's rays concentrated by means of a lens. Lenses of various sizes are used, according to the extent of the area to be treated, and the rays are maintained until a burn of the third degree is produced, with black scabs which come away in a few days. When granulations begin to form, these are again burnt, and one more burning is subsequently made. The area is allowed to skin over, and as a rule, he states, the lupus is then healed. He finds that burns from concentrated sun's rays give a more intensive burn that other applications. The treatment should be carried out with bright sunshine only. The area to be burnt is anæsthetized. If large it may be necessary to give a general anæsthetic, otherwise an analgesic ointment can be applied. The injection of novocain solutions is not recommended, as he found lupus developed at the site of puncture. Freezing with ethyl chloride may also be used. Pain is produced only during the act of burning and not later, and again when the scales fall off pain reappears, but the patients have declared that the pain is altogether much less than they experienced under treatment by acids. When the burnt areas are healed, scars remain which at first are rather unsightly, but after a year or so are almost indistinguishable from the normal skin. The diet given to these patients is full and varied, salt is not omitted, but on the other hand spices are cut down and prominence is given to fresh fruit and vegetables.—(*Münchener Medizinische Wochenschrift*, 15 July, 1932, lxxix, 1161.)

The Isolation of Brucella Abortus from Tonsils

C. M. Carpenter and Ruth A. Boak point out that although undulant fever is now a well-established disease of man, much information is wanting concerning its diagnosis, modes of infection, pathology and treatment. There are those who believe that *Brucella abortus* gains entrance to the body only through wounds, while others prefer to accept the digestive tract as the common channel through which the invasion occurs. In studying the effect of feeding milk artificially and naturally infected with *Brucella abortus* to calves, Carpenter observed that the lymph nodes draining the mouth and pharynx became infected first and remained infected the longest of any of the tissues examined. This observation on calves suggested a further study of diseased tonsils from man. A study was made on 55 pairs of tonsils removed by surgeons after such clinical diagnoses as abscess, hypertrophy, chronic tonsillitis, rheumatism, endocarditis and arthritis; a study was also made of the tonsils from a patient with undulant fever. The results of these examinations revealed *Brucella abortus* in either one or both tonsils from 8 of the 56 patients; in three patients, the organism was recovered from both tonsils, while in the other five it was obtained from only one. The authors do not desire at this time to convey the impression that *Brucella abortus* is a cause of tonsillitis or of hypertrophied tonsils. Nevertheless, in experimental and domesticated animals the infection localizes in lymph and lymphoid tissue, frequently producing a focal or general lymphaderitis. The most important deduction is that the presence of the organisms in the tonsils must be the result of ingestive dairy products containing *Brucella abortus*. The incidence of positive results depends on the virulence and the number of *Brucella abortus* in the raw milk supply.—(*Journal of the American Medical Association*, July 23, 1932, xcix, 296.)

The Relief of Pain in Cancer

R. J. Behan emphasizes the value of calcium in relieving pain in cancer. At first calcium was given by him in the form of the chloride and administered intravenously; later the gluconate was given intravenously for cases in which a rapid reaction was desired, and intramuscularly (in 1 gram doses) if immediate results were not so urgent. In addition large doses of calcium (2 grams of the gluconate, thrice daily) were given by mouth, and also cod-liver oil, to stimulate the activity of the calcium.—(*American Journal of Surgery*, August, 1932, xvii, 242.)

Reviews of Books

Heart Disease: the Principles of Diagnosis and Treatment. By CRICHTON BRAMWELL, M.D., F.R.C.P. London: Edward Arnold and Co., 1932. Pp. vii and 244. Figs. 52. Price 12s. 6d.

WITH a good training in the laboratory investigation of cardiovascular physics the author follows in the steps of his father, the late Sir Byrom Bramwell, the great clinician, whose "Disease of the Heart and Thoracic Aorta," published in 1884, represented up-to-date knowledge half a century ago. Since then much new material has accumulated and the methods of laboratory research have revolutionized cardiology. In the present volume the advances due to the late Sir James Mackenzie and Sir Thomas Lewis are admirably blended with the wise insight of the clinician who acts on the principle that the mental element modifies to a greater or less extent the clinical pictures of disease; this attitude is naturally prominent in the last section of the book, that on treatment and prognosis. While admitting that tobacco is a poison, though a pleasant one, to the heart, the author fully recognizes the individual differences of tolerance and would usually allow a chronic cardiac patient two ounces a week, or half the ration for an ordinary healthy man. The text is based on lectures forming part of a systematic course at Manchester, and is attractively clear, convincingly practical, and free from any solemnity. Clinical pictures and cases skilfully introduced largely take the place of all-inclusive descriptions. An early chapter on "imaginary heart disease" is followed by an account of the athlete's heart, thus recalling "University Oars" (1873), by John Morgan, a former Manchester physician. Dr. Bramwell includes his own observations on two hundred Olympic athletes, and suggests that the explanation of the cardiac hypertrophy found in Marathon but not in other runners, is that the larger heart enables some men to become Marathon runners rather than that the condition of the heart is due to their exertions. The various forms of cardiac disorder are well illustrated by electrocardiograms. The success of this volume may be confidently prophesied.

Vitamins: A Survey of Present Knowledge. Medical Research Council, Special Report Series, No. 167. London: H.M. Stationery Office, 1932. Pp. 332. Figs. 34. Price 6s. 6d.

THIS valuable and timely report of a Committee appointed by the Medical Research Council jointly with the Lister Institute of Preventive Medicine follows similar summaries in 1919 and 1924. The chairman of this Committee is Professor Edward Mellanby, of Sheffield, the secretary, Miss Harriette Chick, and the general editor, Professor Arthur Harden. Since the first report in 1919 "On the present state of knowledge concerning accessory Food Factors (Vitamines)" many changes have taken place—the alteration in spelling is of course a minor event as compared with the enormous expansion of the subject; in 1924 three vitamins only were clearly recognized, whereas now the existence of at least eight is established. In the interesting historical introduction it is shown that, just as was the case in the early days of the nternal secretions, there was a mental bias against the recogni-on of morbid conditions due to such a negative factor as eficiency; some positive influence, even if a merely antagonistic ction to a hypothetical toxin had a more attractive appeal. lthough the prevalence of scurvy in the Royal Navy before James ind's treatment by lemon juice was brought in at the end of the ghteenth century should have suggested a deficiency disease, e first clear evidence, based on experiment, for the existence vitamins dates from the school of Bunge, in Bonn, in 1881. ven then advance was slow, and Pekelharing's definite statement f the vitamin doctrine, in 1905, failed to attract proper attention. Vitamins A to E (the specific vitamin essential for reproduction) are described in subsequent chapters, and the vitamin B complex which consists of five or more constituents, is fully described; one of them, B_2, or in America known as vitamin G, has been egarded as the pellagra-preventive dietary factor. A section is devoted to " refection," which is the term used to describe the remarkable condition in which rats can live and grow normally without any supply of the vitamin B complex. It is infectious and is transmitted by the fæces of refected rats, which contain more B-vitamins than those of rats deprived of these vitamins, thus suggesting that in refected rats the vitamin B complex is ynthetized by means of a micro-organism which, however, has ot been isolated. The amount of new knowledge set before the reader in this report is of enormous importance and there can be little doubt that, like the previous reports on vitamins, it will rapidly be sold out.

The Lame, the Halt and the Blind: the Vital Rôle of Medicine in the History of Civilization. By HOWARD W. HAGGARD, M.D. London: William Heinemann (Medical Books), 1932. Pp. xxv and 420. Illustrations 200. Price 21s.

THE author, who is Associate Professor of Applied Physiology in Yale University, has followed up his successful volume on " Devils, Drugs and Doctors " (1929) by an equally, or perhaps even more, attractive collection of essays, some grave, others with amusing incidents, about the phases and fashions in medicine, mainly in the past. Pleasantly written with the avoidance of technicalities it can be easily read by laymen and historians who possibly may thus be converted to the author's conviction that medicine to-day is almost the religion of man's salvation on earth, and the most practical and humane philosophy that has ever been evolved. Generously illustrated in the proportion of one to every other page, there are many of a curious nature, and a number of interesting title-pages are reproduced, such as that of Sir John Harington's "Anatomie of the Metamorphosed Ajax. A Sanitary Pun, 1596," in the first part of this volume, which is called " Medicine's Place in History "; in the second part quacks are considered; the third part on " the humanitarians " deals with nurses and with American medicine, and in subsequent parts small-pox, tuberculosis, the progress of surgery come with other subjects under review. It is a storehouse of information about the bypaths of medical history.

Practical Treatment of Skin Diseases. By EDUARD AHLSWEDE, M.D. New York: Paul B. Hoeber, 1932. Pp. 770. Illustrations 77. Price 12 dollars.

THIS book has been written with a view to supplying a long felt want, namely, that of a comprehensive work on dermatological therapy, of which it is in fact the only example in the English language. The work is divided into two parts. The first (pages 1—164) is devoted to the general principles of treatment, and includes the following sections: (1) The pharmacological action of the more important external remedies used in dermatological therapeutics, and the technique of the application of these remedies. (2) The internal treatment of diseases of the skin, including the use of drugs, dietaries, non-specific protein therapy and endocrine therapy. (3) Physical and electrical therapy, including the use of carbon dioxide snow, electrolysis, the galvano cautery, diathermy, actino-therapy, X-rays and radium. In this section technical details are described with great precision. In the second part of the book (pages 165-718) the individual diseases are dealt with in alphabetical order; and in each case a short description of the salient clinical and pathological features of the disease precedes the description of the treatment. Finally there is a short appendix (pages 721-734) containing a list of the more important prescriptions, most of which are found scattered throughout the book. Although the principles of treatment advanced are mostly of central European origin, authorities from many other countries are quoted, for example, free use is made of McKee's valuable work on X-ray and radium therapy, and the treatment of tropical diseases has been drawn from authoritative sources. The author deserves to be congratulated heartily on the extremely thorough, painstaking and efficient manner in which he has accomplished his difficult task. Though presumably few will attempt to read the work from cover to cover, there are doubtless many who will find in it a very valuable source of reference. Dermatologists in particular will be grateful for a work which embodies more comprehensively than any other in the English language the therapeutic experience of generations of their colleagues.

Laboratory Service and the General Practitioner: An Interpretation of Pathological Aids to Diagnosis. By ARNOLD RENSHAW, M.D., D.P.H. Oxford University Press. London: Humphrey Milford, 1932. Pp. xii and 267. Figs. 8. Price 10s. 6d.

THIS useful and concisely written handbook is designed to help the clinician by indicating what laboratory investigations should be made in order to arrive at a diagnosis in various conditions; obviously also it will tend to prevent the employment of tests which are unlikely to throw any light on the nature of the case. The earlier chapters deal with the examination of the sputum, gastric contents, urine and cerebro-spinal fluid. The tests for enal, hepatic and pancreatic efficiency receive due attention, and the chapter on the indications for blood counts covers a large field. The clinician should welcome the chapters dealing with the diagnostic methods to be employed in cases of obscure fever and of swellings or tumours of doubtful nature; it is suggested that laboratory assistance should be sought when a temperature of 104° F. lasts for more than two days, one of 102° F. for five days, and one of 100° F. for seven or ten days. In the appendix the laboratory tests most useful in various diseases are tabulated in such a way as to provide the practitioner at a glance with the desired information as he hurries to the patient.

Colonic Irrigation. By W. KERR RUSSELL, M.D., B.S. Edinburgh: E. and S. Livingstone, 1932. Pp. ix and 191. Illustrations 28. Price 10s. 6d.

THIS is a very complete account of the modern treatment of constipation by colonic irrigation, which by means of colonic gymnastics stimulates the bowel to perform its function, and, being the only rational method, cures constipation. The disadvantages of purgative pill treatment are emphasized by Alvarez's dictum: " Why upset twenty-four feet of intestine with a purgative when the material to be removed is in the rectum or sigmoid, within easy reach of a little water? " Enemas are a very ancient form of treatment, as is shown in the interesting chapter on the history of clysters and colonic lavage, which contains a full account of Plombières; the reason why the popularity of the clyster in the seventeenth and eighteenth centuries waned in the nineteenth century is regarded as the amazing variety of purgative pills showered so lavishly on the world by enterprising manufacturers. The anatomy and physiology of the colon, and the fæces, flora and parasites of the intestine are summarized in successive chapters. The various apparatus used now in colonic lavage, the technique, and the effects are then described in detail with numerous illustrations. The contra-indications and dangers, such as severe cardiac weakness, advanced arteriosclerosis in which cerebral hæmorrhage may be induced, an idiosyncrasy to enemas, severe Graves' disease and high fever, are clearly pointed out, and in conclusion the conditions in which colonic lavage has proved beneficial are detailed.

Lang's German–English Dictionary of Medical Terms. 4th edition. Edited by MILTON K. MEYERS, M.D. London: J. & A. Churchill. Pp. viii and 926. Price 45s.

THE present edition of this excellent German–English dictionary now contains approximately 56,500 definitions. Edited by an American physician its previous editions have proved invaluable to English readers of German medical literature, and the latest revision makes it more useful than ever.

Notes and Preparations

INTRA-ABDOMINAL TUBAL INSUFFLATION CANNULA

Mr. A. C. Palmer, F.R.C.S., F.C.O.G., writes:—This instrument is designed for the insufflation of the Fallopian tubes from the abdominal cavity. When the result of the cervical insufflation is in doubt, and the abdomen has been opened for some other purpose, the use of the instrument gives definite information with regard to the patency of the tubes. In cases of displacement accompanied by adhesions, with or without closure of the abdominal ostia, the cannula again gives reliable information; it can also be used for stretching a fibrosed isthmus. Normally gas passes in one tube and out of the other at 30–50 mm. Hg, and, on occluding one tube, the gas passes out of the cervix at a slightly higher pressure. For the purpose of stretching the isthmus, the pressure can be raised to 180–200 mm. Hg without injury to the tube. This cannula was made for me by Mr. Chas. F. Thackray, 252, Regent Street, London, W.1, and Park Street, Leeds.

I-SO-GEL

I-so-gel is a new laxative, prepared by Messrs. Allen & Hanburys (London, E.2) from bassorin, in the form of crisp, pink, almost tasteless granules. In a recent article in this journal, by Dr. F. B. Parsons (The Practitioner, July, 1932, cxxix, 79), it was shown, as the result of experiments and clinical observations, that bassorin was more efficient as a laxative than agar, having greater hygroscopic qualities and requiring to be taken in smaller quantities in order to produce the same therapeutic effect. I-so-gel, being highly viscid when moist, does not leak through the anal sphincter, is not absorbed or digested, and does not cause griping or discomfort.

OBSTETRIC CALCULATOR

Messrs. Trufood (46–47 Chancery Lane, London, W.C.2), the manufacturers of milk products, have issued an ingenious obstetric calculator, made of celluloid, in a case, which is available for any member of the medical profession, free of cost.

DECHOLIN

We are asked to state that the makers of Decholin (mentioned in an article on "The Oral Treatment of Diabetes Mellitus," The Practitioner, May, 1932, cxxviii, 538) are Messrs. J. D. Riedel-E. de Haen A.G., of Berlin, and that their sole agents are the Old Strand Chemical & Drug Co., Ltd., 41, Great Tower Street, London, E.C.3, and not as stated in the article.

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